Diocese of Raleigh
Catholic Schools

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Math II Standards
Diocese of Raleigh

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THE DIOCESE OF RALEIGH
MISSION OF THE CATHOLIC SCHOOLS

The mission of the Diocese of Raleigh is to engage our school/preschool communities in creating a quality education within a Catholic environment that fosters the current and future development of the whole child.

DIOCESE OF RALEIGH CATHOLIC SCHOOLS: A FOUNDATION FOR LIFE

"School is one of the educational environments where one grows by learning how to live, how to become grown-up, mature men and women...Following what St. Ignatius teaches us, the main element in school is learning to be magnanimous...This means having a big heart, having a greatness of soul. It means having grand ideals, the desire to achieve great things in response to what God asks of us and, precisely because of this, doing everyday things, all our daily actions, commitments, and meetings with people well. [It means] doing the little everyday things with a big heart that is open to God and to others." Pope Francis

{Excerpts from Pope Francis: Speech address on June 7, 2013 on the importance of Catholic education in schools in Italy and Albania in the Paul VI Audience Hall.}

Math

Values & Attitudes

Catholic Schools exist so that curriculum may be taught in the light of Gospel teachings. Teachers are encouraged to reinforce Gospel truths and values so that students may serve as witnesses to their Catholic faith. The values listed will assist students to develop a critical conscience in every content area. Values and attitudes are not necessarily quantifiable but rather identified in a student's respect toward the content area.

1. All people are created with minds and the gift to reason.
2. God made each of us as a unique individual.
3. Recognize our talents and share them with one another in order to do God's will.
4. There is a definite sense of order, balance and symmetry in God's universe.
5. God's world is composed of recognizable spacing, measurement and geometric design.

Mathematical Practices

"These standards describe student behaviors, ensure an understanding of math and focus on developing reasoning and building mathematical communication. Each standard has a unique focus, but each also interweaves with the others as we put them into practice. These practices empower students to use math and to think mathematically. Our job as teachers is to help students develop these practices to become effective mathematicians."

National Council of Teachers of Mathematics

1) Make sense of problems and persevere in solving them.
2) Reason abstractly and quantitatively.
3) Construct viable arguments and critique the reasoning of others.
4) Model with mathematics.
5) Use appropriate tools strategically.
6) Attend to precision.
7) Look for and make use of structure.
8) Look for and express regularity in repeated reasoning.
9) Use inductive and deductive reasoning. (Diocese of Raleigh – DOR)

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	Competency Goal 1:	Math II
The learner will solve quadratic equations and identify key features of quadratic functions.		
Objectives:		
1.01 Review factoring quadratics of the form $ax^2 + bx + c$, solving quadratic equations by factoring, and solving quadratic equations by taking the square root	1.08 Analyze quadratic functions by key features including domain and range, intercepts, increasing and decreasing intervals, positive and negative intervals, rate of change, extreme values, symmetries and end behavior	1.15 Complete quadratic regressions using appropriate data
1.02 Understand the result of operations with complex numbers, especially expressed as solutions to a quadratic equation	1.09 Determine the direction of a parabola based upon the leading coefficient	1.16 Build a quadratic function based on a graph, a table, or a description
1.03 Recognize the difference between exact, simplified, and approximate answers, especially when it comes to irrational answers obtained in solving quadratic equations	1.10 Use the discriminant to determine the nature of solutions	1.17 Compare and contrast quadratic functions with other function, either looking at two functions of the same type or two different functions in all three forms - numerical, graphical and algebraic
1.04 Solve quadratic equations by completing the square	1.11 Use the vertex form of a quadratic equation to determine the vertex and AOS	1.18 Solve and apply systems of equations involving quadratic and linear equations

1.05 Solve quadratic equations by using the Quadratic Formula, getting both exact and approximate answers	1.12 Use the standard form of a quadratic to find the zeroes of the function	1.19 Determine transformations of quadratic functions
1.06 Explain solving process for an equation, including the reason a certain method was chosen for solving the equation	1.13 Use a calculator to find zeroes and the vertex	1.20 Graph quadratic inequalities of the form $y < ax^2 + bx + c$ or $y > ax^2 + bx + c$
1.07 Solve and apply one-variable models based on quadratic equations	1.14 Devise two variable models using quadratic functions, including projectile motion	1.21 Graph quadratic inequalities of the form $ax^2 + bx + c < 0$ or $ax^2 + bx + c > 0$ (Honors)
	Competency Goal 2:	**Math II**
The learner will solve radical equations and identify key features of square root and cube root (honors) functions.		
Objectives:		
2.01 Determine the defining characteristic of rational and irrational numbers	2.05 Solve radical equations and identify extraneous solutions	2.09 Analyze radical functions (square and cube root) by key features including domain and range, intercepts, increasing and decreasing intervals, positive and negative intervals, rate of change, extreme values, symmetries and end behavior
2.02 Review and extend all operations with radicals and complex numbers, including division using conjugates	2.06 Explain solving process for an equation, including the reason a certain method was chosen for solving the equation	2.10 Determine transformations of radical functions
2.03 Define rational exponents and extend use of the rules of exponents to include rational exponents	2.07 Solve and apply one-variable models based on radical equations	2.11 Solve problems involving two variable models using radical functions (or functions with rational exponents)

2.04 Simplify expressions with radicals	2.08 Represent radical functions as graphs, tables and equations	2.12 Solve and apply systems of equations involving square root, quadratic and linear equations
Competency Goal 3:		**Math II**
The learner will solve inverse variation equations and identify key features of inverse variation functions.		
Objectives:		
3.01 Explain solving process for an equation involving inverse variation, including the reason a certain method was chosen for solving the equation	3.04 Identify the placement of an asymptote in an inverse variation function.	3.07 Solve and apply systems of equations involving square root, quadratic, inverse variation, and linear equations.
3.02 Solve and apply one-variable models based on inverse variation equations	3.05 Determine transformations of inverse variation functions.	
3.03 Analyze inverse variation functions ($y = \frac{k}{x}$) by key features including domain and range, intercepts, increasing and decreasing intervals, positive and negative intervals, rate of change, extreme values, symmetries and end behavior	3.06 Solve problems involving two variable models using inverse variation functions	

	Competency Goal 4:	Math II
The learner will explore transformations of generic parent functions.		
Objectives:		
4.01 Perform transformations in the plane, including reflections, translations and vertical and horizontal stretching and shrinking (rotation not included here)	4.02 Transform all toolkit functions in various notational formats, given the functions. (At this level students are not expected to memorize functions that they have not studied, but can learn to transform absolute value, sine, and other functions - or other generic piecewise functions that are easy to transform - especially horizontal stretching and shrinking. Students need only be given the graph without a function definition.)	
	Competency Goal 5:	Math II
The learner will use Geometry to perform transformations in a plane.		
Objectives:		
5.01 Relate a rigid transformation or a series of rigid transformations to congruence of a figure	5.05 Describe transformations as a new type of function that maps ordered pairs to ordered pairs	5.09 Work experimentally with properties of rotations, reflections and translations including reflections across parallel lines and the equivalence of rotations with reflections
5.02 Perform transformations in the plane, including reflections, rotations, translations, and dilations	5.06 Describe transformations using matrix operations (honors)	5.10 Use coordinate geometry to verify congruent distances, as well as parallel and perpendicular relationships in transformations

5.03 Represent transformations in a plane using a variety of notations	5.07 Compare properties of transformations	
5.04 Compose a series of transformations or write a series of transformations to describe the relationship between an image and a preimage	5.08 Describe and illustrate center of rotation and angles of rotation for rotational symmetries axes of reflection for reflectional symmetries	
Competency Goal 6:		**Math II**

The learner will use geometric and algebraic properties of figures to solve problems and write proofs.

Objectives:		
6.01 Use properties of angle pairs created by special line relationships: vertical angles, alternate interior angles, corresponding angles, supplementary and complementary angles	6.06 Show that two triangles are similar using AA, SAS and SSS similarity shortcuts	6.11 Prove theorems about congruent triangles and their congruent parts
6.02 Explore and justify properties of a perpendicular bisector	6.07 Solve real world problems using similar triangles	6.12 Use the Triangle Sum Theorem to find values of missing angles in a triangle
6.03 Prove theorems about parallel lines cut by a transversal	6.08 Use the definition of congruence in terms of rigid motions to explain why two figures are congruent	6.13 Use the Isosceles Triangle Theorem to solve for missing sides and angles
6.04 Solve problems involving ratios and proportions	6.09 Explore what it means for two triangles to be determined to be congruent using ASA, SAS, and SSS, AAS, and ASA	6.14 Use Midsegment Theorem and the Triangle Proportionality Theorem to solve for missing values in a triangle

6.05 Show that two polygons are similar using the definition of similar figures	6.10 Show why AAA and SSA criteria are not sufficient to prove that two triangles are congruent	
	Competency Goal 7:	**Math II**
The learner will apply right triangle trigonometry to solve problems.		
Objectives:		
7.01 Use similarity to prove the Pythagorean Theorem	7.06 Evaluate and solve expressions and equations involving trigonometric functions	
7.02 Use the Pythagorean Theorem to measure triangle sides and its converse to classify triangles	7.07 Use relationships in special right triangles	
7.03 Apply the Pythagorean Theorem to real world problems	7.08 Solve for missing sides and angles in right triangles	
7.04 Relate the Pythagorean Theorem to the distance formula	7.09 Apply methods of trigonometry to real world problems	
7.05 Develop the relationship that leads from similar right triangles to right triangle trigonometry definitions		

	Competency Goal 8:	Math II
The learner will apply the principles of probability to real-world events.		
Objectives:		
8.01 Participate in simulations to determine whether experimental probability is consistent with theoretical probability	8.06 Use probability notation	
8.02 Describe events using set notation including unions, intersections and complements	8.07 Represent and compute independent and conditional probabilities using two-way frequency tables	
8.03 Define the sample space for an event using lists, tables, tree diagrams	8.08 Apply the Addition Rule for mutually inclusive or exclusive events	
8.04 Show subsets using a Venn diagram	8.09 Apply the Multiplication Rule of independent and dependent events	
8.05 Use probability notation		