

Diocese of Raleigh Catholic Schools

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Raleigh, NC 27613

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K-8 Math Standards Diocese of Raleigh

May 2018

**THE DIOCESE OF RALEIGH SCHOOLS:
MISSION OF OUR 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
Philosophy**

Mathematics reflects the order and unity in God’s universe. Our society depends upon the use of Science, Technology, Religion, Engineering, Art and Math. It relies upon a mathematical knowledge which assists students in developing the ability to reason, think critically, and logically. All students will develop practical tools for daily living and the ability to discover creative ways to solve problems.

PREFACE

These guidelines contain four levels of standards:

Kindergarten - Grade 2

Grade 3 - Grade 4

Grade 5 - Grade 6

Grade 7 - Grade 8

Standards for Mathematical Practice

1. Analyze problems critically and persevere in solving them.	5. Use both tactile and technological tools appropriately.
2. Understand relationships between real-life situations and mathematical symbols.	6. Attend to detail and precision.
3. Construct viable arguments and critique the reasoning of others.	7. Seek and make use of patterns and repeated reasoning.
4. Model with mathematics using a variety of methods.	8. Justify reasoning and solutions.

INTRODUCTION

The following mathematical standards are intended for use in all Diocese of Raleigh Catholic elementary and middle schools. All students should have the opportunity and the support necessary to learn significant mathematics with depth and understanding whereby ideas are linked to and build on one another so students' understanding and knowledge deepen and their ability to apply mathematics expands. Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well. They must learn mathematics with understanding, actively building new knowledge from experience and previous knowledge. Assessments should support the learning of important mathematics and furnish useful information to both teachers and students.

STRUCTURE

Overarching Standards
Achievement Standards
Grade Level Goals

Overarching Standards

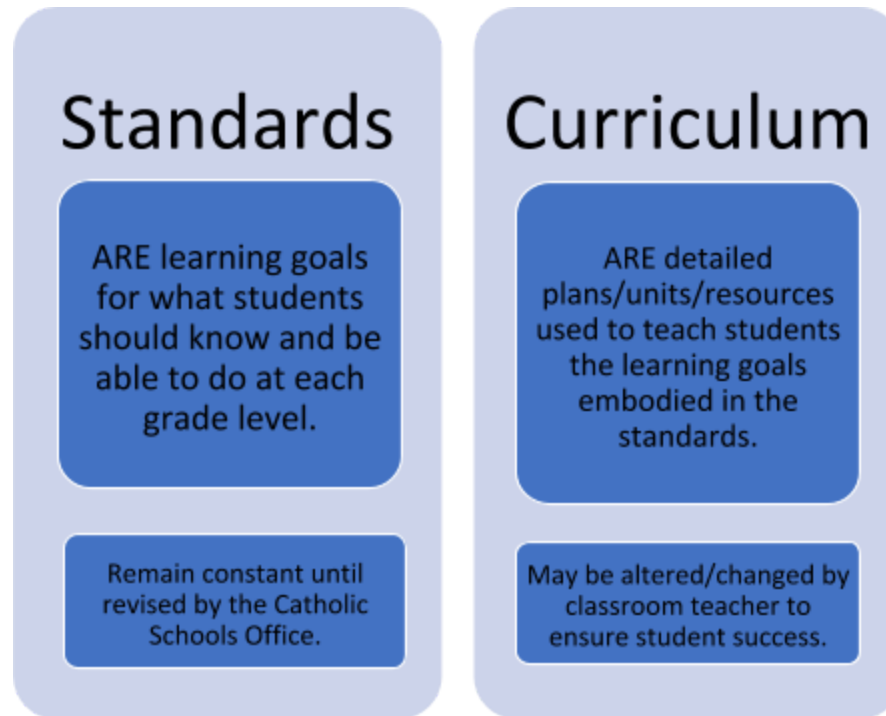
- Counting and Cardinality [CC]
- Operations and Algebraic Thinking [OA]
- Number and Operations in Base Ten [NBT]
- Number and Operations - Fractions [NF]
- Measurement and Data [MD]
- Geometry [G]
- Ratio and Proportional Relationships [RP]
- The Number System [NS]
- Expressions and Equations [EE]
- Statistics and probability [SP]
- Functions [F]

SAMPLE

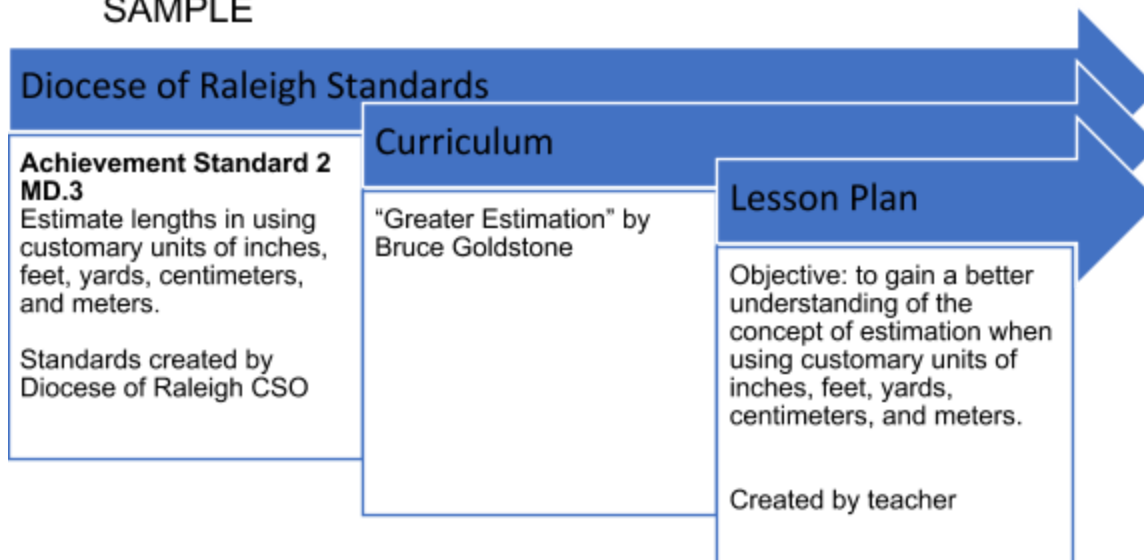
Counting and Cardinality		← Overarching Standard
Achievement Standard: K.CC 1 Know number names and the counting sequence.		← Achievement Standard
K.CC 1.1	Know number names and recognize patterns in the counting sequence by: <ul style="list-style-type: none"> Counting to 100 by ones. Counting to 100 by tens. 	← Goals
K.CC 1.2	Count.....	
K.CC 1.3	Write numbers.....	

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SAMPLE



Eighth Grade

The Number System	
Achievement Standard: 8.NS.1 Understand and compute with real numbers.	
8.NS.1.1	Understand that every number has a decimal expansion. With the knowledge of the definition of a rational number, realize that an irrational number is defined as a non-repeating, non-terminating decimal.
8.NS.1.2	Approximate irrational numbers as rational numbers to compare the size of irrational numbers to rational numbers and to locate them approximately on a number line. Estimate the value of expressions involving square roots and cube roots at least to the tenths place and pi to the hundredths place.

Expressions and Equations	
Achievement Standard: 8.EE.1 Work with radicals and integer exponents.	
8.EE.1.1	Develop and apply the properties of integer exponents to generate equivalent numerical expressions, including rewriting negative exponents as positive exponents.
8.EE.1.2	Use square root and cube root symbols to: <ul style="list-style-type: none"> • Represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. • Evaluate square roots of perfect squares and cube roots of perfect cubes up to 400.
8.EE.1.3	Use scientific notation to express very large and very small quantities and order numbers in scientific notation
8.EE.1.4	Perform multiplication and division with numbers expressed in scientific notation to solve real-world problems.

Achievement Standard: 8.EE.2 Analyze and solve linear equations and inequalities.	
8.EE.2.1	Solve real-world and mathematical problems by writing and solving equations/inequalities in one variable. <ul style="list-style-type: none"> • Solve linear equations/inequalities including multi-step with variables on both sides. • Recognize linear equations in one variable as having one solution, no solutions, or infinitely many solutions. • Solve literal equations (formulas) for a given value.

Achievement Standard: 8.EE.3 Analyze and solve pairs of simultaneous linear equations.	
8.EE.3.1	<p>Analyze and solve a system of two linear equations in two variables in slope-intercept form.</p> <ul style="list-style-type: none"> • Understand that solutions to a system corresponds to the point of intersection of their graphs because the point of intersection satisfies both equations simultaneously. • Solve real-world mathematical problems leading to systems of linear equations by graphing. Solve simple cases by inspection.

Functions	
Achievement Standard: 8.F.1 Define, evaluate, and compare functions.	
8.F.1.1	<p>Understand that a function is a rule that assigns to each input exactly one output.</p> <ul style="list-style-type: none"> • Recognize functions when graphed as the set of ordered pairs consisting of an input and exactly one corresponding output. • Recognize functions given a table of values or a set of ordered pairs
8.F.1.2	Compare properties of two linear functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
8.F.1.3	Identify linear functions from tables, equations, and graphs.

Achievement Standard: 8.F.2 Use functions to model relationships between quantities.	
8.F.2.1	<p>Analyze functions that model linear relationships.</p> <ul style="list-style-type: none"> • Understand that a linear relationship can be generalized by $y = mx + b$. • Write an equation in slope-intercept form to model a linear relationship by determining the rate of change (slope) and the initial value (y intercept), given at least two (x, y) values or a graph. • Construct a graph of a linear relationship given an equation in slope-intercept form. • Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of the slope and y-intercept of its graph or a table of values.
8.F.2.2	<p>Qualitatively analyze the functional relationship between two quantities.</p> <ul style="list-style-type: none"> • Analyze a graph determining where the function is increasing or decreasing; linear or nonlinear. • Sketch a graph that exhibits the qualitative features of a real-world function.

Geometry

Achievement Standard: 8.G.1 Understand congruence and similarity using physical models, transparencies, or geometry software.

8.G.1.1 Use transformations to define congruence.

- Verify experimentally the properties of rotations, reflections, and translations that create congruent figures.
- Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations.
- Given two congruent figures, describe a sequence that exhibits the congruence between them.

8.G.1.2 Describe the effect of dilations about the origin, translations, rotations about the origin in 90 degree increments, and reflections across the x-axis and y-axis on two-dimensional figures using coordinates.

8.G.1.3 Use transformations to define similarity.

- Verify experimentally the properties of dilations that create similar figures.
- Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations.
- Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

Achievement Standard: 8.G.2 Analyze angle relationships.

8.G.2.1 Use informal arguments to analyze angle relationships.

- Recognize relationships between interior and exterior angles of a triangle.
- Recognize the relationships between the angles created when parallel lines are cut by a transversal.
- Recognize the angle-angle criterion for similarity of triangles.
- Solve real-world and mathematical problems involving angles

Achievement Standard: 8.G.3 Understand and apply the Pythagorean Theorem.

8.G.3.1 Explain the Pythagorean Theorem and its converse.

8.G.3.2 Apply the Pythagorean Theorem and its converse to solve real-world and mathematical problems.

8.G.3.3 Apply the Pythagorean Theorem to find the distance between two points in coordinate system.

Achievement Standard: 8.G.4 Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

8.G.4.1 Understand how the formulas for the volume of cones, cylinders, and spheres are related and use the relationship to solve real-world and mathematical problems.

Statistics and Probability	
Achievement Standard: 8.SP.1 Investigate patterns of association in bivariate data.	
8.SP.1.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Investigate and describe patterns such as clustering, outliers, positive or negative association, linear and nonlinear association.
8.SP.1.2	Model the relationship between bivariate quantitative data to: <ul style="list-style-type: none"> ● Informally fit a straight line for a scatter plots that suggest linear association (Line of Best Fit). ● Informally assess the model fit by judging the closeness of the data points to the line.
8.SP.1.3	Apply knowledge of linear equations to use the equation of a linear model to solve problems of bivariate quantitative data, interpreting the slope and y-intercept.
8.SP.1.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table: <ul style="list-style-type: none"> ● Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. ● Use relative frequencies calculated for rows or columns to describe possible association between the two variables.

Progression Chart available in separate document