

Catholic Identity Standards

8.0 The student understands and integrates the content of what is learned into their faith and daily life.

- 8.0A recognize that every human life is sacred because each person is created and loved by God
- 8.0B describe ways to take part in/be responsible to the community by discerning and using our God-given gifts
- 8.0C recognize and oppose unjust social structures and work toward justice for all
- 8.0D see God at work in all things and as expressed in the sacraments
- 8.0E connect scripture, tradition, and the models of Mary and the saints to guide, grow, and deepen faith

Mathematical Process Standards

8.1 The student uses mathematical processes to acquire and demonstrate mathematical understanding.

- 8.1A apply mathematics to problems arising in everyday life, society, and the workplace
- 8.1B use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution
- 8.1C select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems
- 8.1D communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate
- 8.1E create and use representations to organize, record, and communicate mathematical ideas
- 8.1F analyze mathematical relationships to connect and communicate mathematical ideas
- 8.1G display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication
- 8.GS1* demonstrate the mental habits of precise, determined, careful, and accurate questioning, inquiry, and reasoning in the pursuit of transcendent truths
- 8.GS2* develop lines of inquiry to understand why things are true and why they are false
- 8.GS3* have faith in the glory and dignity of human reason as both a gift from God and a reflection of Him in whose image and likeness we are made
- 8.GS4* explain how mathematics in its reflection of the good, true, and beautiful reveals qualities of being and the presence of God
- 8.DS8* exhibit humility at knowing that as a human being man can only grasp a portion of the truths of the universe
- 8.DS9* advance an understanding of the ability of the human intellect to know and the desire of the will to want to know more

Numbers and Operations

8.2 The student applies mathematical process standards to represent and use real numbers in a variety of forms.

- 8.2A extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of real numbers
- 8.2B approximate the value of an irrational number, including π and square roots of numbers less than 225, and locate that rational number approximation on a number line
- 8.2C convert between standard decimal notation and scientific notation
- 8.2D order a set of real numbers arising from mathematical and real-world contexts
- 8.IS6* evaluate the ongoing nature of mathematical inquiry, its inexhaustibility, and its openness to the infinite

Proportionality

8.3 The student applies mathematical process standards to use proportional relationships to describe dilations.

- 8.3A generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation
- 8.3B compare and contrast the attributes of a shape and its dilation(s) on a coordinate plane
- 8.3C use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation

Proportionality

8.4 The student applies mathematical process standards to explain proportional and non-proportional relationships involving slope.

- 8.4A use similar right triangles to develop an understanding that slope, m , given as the rate comparing the change in y -values to the change in x -values, $(y_2 - y_1) / (x_2 - x_1)$, is the same for any two points (x_1, y_1) and (x_2, y_2) on the same line
- 8.4B graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship
- 8.4C use data from a table or graph to determine the rate of change or slope and y -intercept in mathematical and real-world problems

Proportionality

8.5 The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions

8.IS3* Recognize how mathematical arguments and processes can be extrapolated to other areas of study, including theology and philosophy

- 8.5A represent linear proportional situations with tables, graphs, and equations in the form of $y = kx$
- 8.5B represent linear non-proportional situations with tables, graphs, and equations in the form of $y = mx + b$, where $b \neq 0$
- 8.5C contrast bivariate sets of data that suggest a linear relationship with bivariate sets of data that do not suggest a linear relationship from a graphical representation
- 8.5D use a trend line that approximates the linear relationship between bivariate sets of data to make predictions
- 8.5E solve problems involving direct variation
- 8.5F distinguish between proportional and non-proportional situations using tables, graphs, and equations in the form $y = kx$ or $y = mx + b$, where $b \neq 0$

8.5G	identify functions using sets of ordered pairs, tables, mappings, and graphs
8.5H	identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems
8.5I	write an equation in the form $y = mx + b$ to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations

Expressions, Equations, and Relationships

8.6 The student applies mathematical process standards to develop mathematical relationships and make connections to geometric formulas.

8.6A	describe the volume formula $V = Bh$ of a cylinder in terms of its base area and its height
8.6B	model the relationship between the volume of a cylinder and a cone having both congruent bases and heights and connect that relationship to the formulas
8.6C	use models and diagrams to explain the Pythagorean theorem
8.IS1*	explain the nature of rational discourse and argument and the desirability of precision and deductive certainty which mathematics makes possible and is not possible to the same degree in other disciplines
8.IS2*	demonstrate how sound logical arguments and other processes of mathematics are foundational to its discipline

Expressions, Equations, and Relationships

8.7 The student applies mathematical process standards to use geometry to solve problems.

8.7A	solve problems involving the volume of cylinders, cones, and spheres
8.7B	use previous knowledge of surface area to make connections to the formulas for lateral and total surface area and determine solutions for problems involving rectangular prisms, triangular prisms, and cylinders
8.7C	use the Pythagorean Theorem and its converse to solve problems
8.7D	determine the distance between two points on a coordinate plane using the Pythagorean Theorem

Expressions, Equations, and Relationships

8.8 The student applies mathematical process standards to use one-variable equations or inequalities in problem situations.

8.8A	write one-variable equations or inequalities with variables on both sides that represent problems using rational number coefficients and constants
8.8B	write a corresponding real-world problem when given a one-variable equation or inequality with variables on both sides of the equal sign using rational number coefficients and constants
8.8C	model and solve one-variable equations with variables on both sides of the equal sign that represent mathematical and real-world problems using rational number coefficients and constants
8.8D	use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles
8.DS6*	propose how mathematical objects or proofs (such as the golden mean, the Fibonacci numbers, the musical scale, and geometric proofs) suggest divine origin

Expressions, Equations, and Relationships

8.9 The student applies mathematical process standards to use multiple representations to develop foundational concepts of simultaneous linear equations.

8.9A	identify and verify the values of x and y that simultaneously satisfy two linear equations in the form $y = mx + b$ from the intersections of the graphed equations
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Two-Dimensional Shapes

8.10 The student applies mathematical process standards to develop transformational geometry concepts.

8.10A	generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane
8.10B	differentiate between transformations that preserve congruence and those that do not
8.10C	explain the effect of translations, reflections over the x - or y -axis, and rotations limited to 90° , 180° , 270° , and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation
8.10D	model the effect on linear and area measurements of dilated two-dimensional shapes
8.IS4*	explain how it is possible to mentally abstract and construct mathematical objects from direct observations of reality and how one's perception of that reality is important to what one is doing

Measurement and Data

8.11 The student applies mathematical process standards to use statistical procedures to describe data.

8.11A	construct a scatterplot and describe the observed data to address questions of association such as linear, non-linear, and no association between bivariate data
8.11B	determine the mean absolute deviation and use this quantity as a measure of the average distance data are from the mean using a data set of no more than 10 data points
8.11C	simulate generating random samples of the same size from a population with known characteristics to develop the notion of a random sample being representative of the population from which it was selected
8.IS5*	recognize personal bias in inquiry and articulate why inquiry should be undertaken in a fair and independent manner

Personal Financial Literacy

8.12 The student applies mathematical process standards to develop an economic way of thinking and problem solving useful in one's life as a knowledgeable consumer and investor.

- 8.12A solve real-world problems comparing how interest rate and loan length affect the cost of credit
- 8.12B calculate the total cost of repaying a loan, including credit cards and easy access loans, under various rates of interest and over different periods using an online calculator
- 8.12C explain how small amounts of money invested regularly, including money saved for college and retirement, grow over time
- 8.12D calculate and compare simple interest and compound interest earnings
- 8.12E identify and explain the advantages and disadvantages of different payment methods
- 8.12F analyze situations to determine if they represent financially responsible decisions and identify the benefits of financial responsibility and the costs of financial irresponsibility
- 8.12G estimate the cost of a two-year and four-year college education, including family contribution, and devise a periodic savings plan for accumulating the money needed to contribute to the total cost of attendance for at least the first year of college