BENCHMARKS WITH EXAMPLES REPORT
MATHEMATICS GRADE 8

ARCHDIOCESE OF CHICAGO

Key:

Status = Benchmarks designated as "Focus" are aligned to the Terra Nova, third edition. Benchmarks designated "Supporting" are not.

OCS Code = The benchmark code. Consists of Grade (K-8), Domain (2-3 character alpha code), Strand (1-3 character alpha code), Standard (1-9), Benchmark Number (1 or 1-1 and up), and Complexity (a, b, c).

CCSS Code = Common Core State Standards, developed by National Governors Association Center for Best Practices, Council of Chief State School Officers (www.corestandards.org).

CRS Strand = ACT College Readiness Standards developed by ACT, Inc. (www.act.org).

The CRS Strands are: BOA = Basic Operations & Applications, PSD = Probability/Statistics/Data, NCP = Numbers/Concepts/Properties, XEI = Expression/Equation & Inequality, GRE = Graphical Representations, PPF = Properties of Plane Figures, MEA = Measurement, FUN = Functions.

DOMAIN: Standards for Mathematical Content				
OCS Code:	**Strand: *The Number System (NS)***	**Examples and Notes:**	**CCSS Code:**	**CRS Strand:**
8.SMC.NS.1	**Know that there are numbers that are not rational, and approximate them by rational numbers.**			
8.SMC.NS.1.1-1.a	Show that numbers that are not rational are irrational		8.NS.A.1	NCP
8.SMC.NS.1.1-2.a	Show that every number has a decimal expansion		8.NS.A.1	NCP
8.SMC.NS.1.1-3.a	Show that for rational numbers the decimal expansion repeats eventually		8.NS.A.1	NCP
8.SMC.NS.1.1-4.a	Convert a decimal expansion which repeats eventually into a rational number		8.NS.A.1	NCP
8.SMC.NS.1.2-1.b	Compare rational approximations of irrational numbers to the size of irrational numbers	e.g., By truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations	8.NS.A.2	NCP
8.SMC.NS.1.2-2.b	Locate rational approximations of irrational numbers on a number line diagram	e.g., By truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations	8.NS.A.2	GRE
8.SMC.NS.1.2-3.b	Estimate the value of expressions by using rational approximations of irrational numbers	e.g., By truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations	8.NS.A.2	NCP
OCS Code:	**Strand: *Expressions and Equations (EE)***	**Examples and Notes:**	**CCSS Code:**	**CRS Strand:**
8.SMC.EE.1	**Work with radicals and integer exponents.**			
8.SMC.EE.1.1-1.a	Show that the properties of integer exponents generate equivalent numerical expressions	e.g., 32 × 3–5 = 3–3 = 1/33 = 1/27	8.EE.A.1	NCP
8.SMC.EE.1.1-2.a	Apply the properties of integer exponents to generate equivalent numerical expressions	e.g., 32 × 3–5 = 3–3 = 1/33 = 1/27	8.EE.A.1	NCP
8.SMC.EE.1.2-1.b	Use square root symbols to represent solutions to equations of the form x2 = p, where p is a positive rational number		8.EE.A.2	XEI
8.SMC.EE.1.2-2.b	Use cube root symbols to represent solutions to equations of the form x3 = p, where p is a positive rational number		8.EE.A.2	XEI
8.SMC.EE.1.2-3.b	Evaluate square roots of small perfect squares	Note: This benchmark only applies to rational numbers.	8.EE.A.2	NCP
8.SMC.EE.1.2-4.b	Evaluate cube roots of small perfect cubes	Note: This benchmark only applies to rational numbers.	8.EE.A.2	NCP
8.SMC.EE.1.3-1.b	Estimate large or small quantities using numbers expressed in the form of a single digit times a whole-number power of 10	e.g., Estimate the population of the United States as 3 times 108 and the population of the world as 7 times 109, and determine that the world population is more than 20 times larger	8.EE.A.3	NCP
8.SMC.EE.1.3-2.b	Compare large quantities to small quantities expressed in the form of a single digit times a whole-number power of 10	e.g., Estimate the population of the United States as 3 times 108 and the population of the world as 7 times 109, and determine that the world population is more than 20 times larger	8.EE.A.3	NCP
8.SMC.EE.1.4-1.c	Perform operations with numbers expressed in scientific notation	e.g., Include problems where both decimal and scientific notation are used	8.EE.A.4	NCP
8.SMC.EE.1.4-2.c	Choose units of appropriate size for measurements of large or small quantities using scientific notation	e.g., Use millimeters per year for seafloor spreading	8.EE.A.4	NCP

8.SMC.EE.1.4-3.c	Interpret numbers that have been expressed in scientific notation which have been generated by technology		8.EE.A.4	NCP
8.SMC.EE.2	**Understand the connections between proportional relationships, lines, and linear equations.**			
8.SMC.EE.2.1-1.b	Graph proportional relationships		8.EE.B.5	GRE
8.SMC.EE.2.1-2.b	Interpret the unit rate as the slope of a graph showing a proportional relationship		8.EE.B.5	GRE
8.SMC.EE.2.1-3.b	Compare two different proportional relationships represented in different ways	e.g., Compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed	8.EE.B.5	GRE
8.SMC.EE.2.2-1.b	Use similar triangles to show that the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane		8.EE.B.6	GRE
8.SMC.EE.2.2-2.b	Derive the equation y = mx for a line through the origin		8.EE.B.6	GRE
8.SMC.EE.2.2-3.b	Derive the equation y = mx + b for a line intercepting the vertical axis at b		8.EE.B.6	GRE
8.SMC.EE.3	**Analyze and solve linear equations and pairs of simultaneous linear equations.**			
8.SMC.EE.3.3-1.b	Create linear equations in one variable with one solution	Note: Successively transform the given equation into simpler forms, until an equivalent equation of the form x = a results.	8.EE.C.7a	XEI
8.SMC.EE.3.3-2.b	Create linear equations in one variable with infinitely many solutions	Note: Successively transform the given equation into simpler forms, until an equivalent equation of the form a = a results.	8.EE.C.7a	XEI
8.SMC.EE.3.3-3.b	Create linear equations in one variable with no solutions	Note: Successively transform the given equation into simpler forms, until an equivalent equation of the form a = b results, where a and b are different numbers.	8.EE.C.7a	XEI
8.SMC.EE.3.3-4.c	Solve linear equations with rational number coefficients	Note: Include equations whose solutions require expanding expressions using the distributive property and collecting like terms.	8.EE.C.7b	XEI
8.SMC.EE.3.4-1.b	Show how solutions to a system of two linear equations in two variables correspond to points of intersection of their graph	Note: Points of intersection satisfy both equations simultaneously.	8.EE.C.8a	GRE
8.SMC.EE.3.4-2.b	Solve systems of two linear equations in two variables algebraically		8.EE.C.8b	XEI
8.SMC.EE.3.4-3.b	Estimate solutions of two linear equations by graphing the equations		8.EE.C.8b	GRE
8.SMC.EE.3.4-4.b	Solve simple cases of systems of two linear equations by inspection	e.g., 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6	8.EE.C.8b	XEI
8.SMC.EE.3.4-5.c	Solve real world and mathematical problems leading to two linear equations in two variables	e.g., Given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair	8.EE.C.8c	XEI
OCS Code:	**Strand: *Functions (F)***	**Examples and Notes:**	**CCSS Code:**	**CRS Strand:**
8.SMC.F.1	**Define, evaluate, and compare functions.**			
8.SMC.F.1.1-1.a	Recognize that a function is a rule that assigns to each input exactly one output		8.F.A.1	FUN
8.SMC.F.1.1-2.a	Relate the graph of a function to the set of ordered pairs consisting of an input and the corresponding output		8.F.A.1	GRE
8.SMC.F.1.2.b	Compare properties of two functions each represented in a different way	e.g., Different ways include algebraically, graphically, numerically in tables, or by verbal descriptions. Given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change	8.F.A.2	FUN
8.SMC.F.1.3-1.c	Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line		8.F.A.3	GRE

8.SMC.F.1.3-2.c	Construct examples of functions that are not linear	Note: The function A = s2 giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.	8.F.A.3	GRE
8.SMC.F.2	**Use functions to model relationships between quantities.**			
8.SMC.F.2.1-1.b	Construct a function to model a linear relationship between two quantities		8.F.B.4	GRE
8.SMC.F.2.1-2.b	Determine the rate of change and initial value of the function from a description of a relationship		8.F.B.4	GRE
8.SMC.F.2.1-3.b	Determine the rate of change and initial value of the function from two (x, y) values	e.g., Include reading the rate of change from a table or graph	8.F.B.4	GRE
8.SMC.F.2.1-4.b	Interpret the rate of change and initial value of a linear function in terms of the situation it models		8.F.B.4	GRE
8.SMC.F.2.1-5.b	Interpret the rate of change and initial value of a linear function in terms of its graph		8.F.B.4	GRE
8.SMC.F.2.1-6.b	Interpret the rate of change and initial value of a linear function in terms of a table of values		8.F.B.4	GRE
8.SMC.F.2.2-1.c	Describe qualitatively the functional relationship between two quantities by analyzing a graph	e.g., Where the function is increasing or decreasing, linear or nonlinear	8.F.B.5	GRE
8.SMC.F.2.2-2.c	Graph the qualitative features of a function that has been described verbally		8.F.B.5	GRE
OCS Code:	**Strand: *Geometry (G)***	**Examples and Notes:**	**CCSS Code:**	**CRS Strand:**
8.SMC.G.1	**Understand congruence and similarity using physical models, transparencies, or geometry software.**			
8.SMC.G.1.1-1.b	Verify experimentally the properties of rotations, reflections, and translations, when lines are taken to lines		8.G.A.1a	PPF
8.SMC.G.1.1-2.b	Verify experimentally the properties of rotations, reflections, and translations, when line segments are taken to line segments of the same length		8.G.A.1a	PPF
8.SMC.G.1.1-3.b	Verify experimentally the properties of rotations, reflections, and translations, when angles are taken to angles of the same measure		8.G.A.1b	PPF
8.SMC.G.1.1-4.b	Verify experimentally the properties of rotations, reflections, and translations, when parallel lines are taken to parallel lines		8.G.A.1c	PPF
8.SMC.G.1.2-1.b	Show 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		8.G.A.2	MEA
8.SMC.G.1.2-2.b	Describe a sequence that exhibits the congruence between two congruent figures		8.G.A.2	MEA
8.SMC.G.1.3-1.b	Describe the effect of dilations on two-dimensional figures using coordinates		8.G.A.3	GRE
8.SMC.G.1.3-2.b	Describe the effect of translations on two-dimensional figures using coordinates		8.G.A.3	GRE
8.SMC.G.1.3-3.b	Describe the effect of rotations on two-dimensional figures using coordinates		8.G.A.3	GRE
8.SMC.G.1.3-4.b	Describe the effect of reflections on two-dimensional figures using coordinates		8.G.A.3	GRE
8.SMC.G.1.4-1.b	Relate one two-dimensional figure as similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations		8.G.A.4	MEA

8.SMC.G.1.4-2.b	Describe a sequence that exhibits the similarity between two similar two-dimensional figures		8.G.A.4	MEA
8.SMC.G.1.5-1.c	State informal arguments to establish facts about the angle sum of triangles	e.g., Arrange three copies of the same triangle so that the sum of the three angles appears to form a line	8.G.A.5	PPF
8.SMC.G.1.5-2.c	State informal arguments to establish facts about the exterior angle of triangles		8.G.A.5	PPF
8.SMC.G.1.5-3.c	State informal arguments to establish facts about the angles created when parallel lines are cut by a transversal		8.G.A.5	PPF
8.SMC.G.1.5-4.c	State informal arguments to establish facts about the angle-angle criterion for similarity of triangles	e.g., Arrange three copies of the same triangle so that the sum of the three angles appears to form a line	8.G.A.5	PPF
8.SMC.G.2	**Understand and apply the Pythagorean Theorem.**			
8.SMC.G.2.1-1.b	Explain a proof of the Pythagorean Theorem		8.G.B.6	PPF
8.SMC.G.2.1-2.b	Explain a proof of the converse of the Pythagorean Theorem		8.G.B.6	PPF
8.SMC.G.2.2-1.c	Solve real world and mathematical problems in two dimensions using the Pythagorean Theorem to determine unknown side lengths in right triangles		8.G.B.7	PPF
8.SMC.G.2.2-2.c	Solve real world and mathematical problems in three dimensions using the Pythagorean Theorem to determine unknown side lengths in right triangles		8.G.B.7	PPF
8.SMC.G.2.3.c	Find the distance between two points in a coordinate system using the Pythagorean Theorem		8.G.B.8	PPF
8.SMC.G.3	**Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.**			
8.SMC.G.3.1-1.b	Solve real world and mathematical problems using the formula for the volume of cones		8.G.C.9	MEA
8.SMC.G.3.1-2.b	Solve real world and mathematical problems using the formula for the volume of cylinders		8.G.C.9	MEA
8.SMC.G.3.1-3.b	Solve real world and mathematical problems using the formula for the volume of spheres		8.G.C.9	MEA
OCS Code:	**Strand: *Statistics and Probability (SP)***	**Examples and Notes:**	**CCSS Code:**	**CRS Strand:**
8.SMC.SP.1	**Investigate patterns of association in bivariate data.**			
8.SMC.SP.1.1-1.a	Construct scatter plots for bivariate measurement data		8.SP.A.1	PSD
8.SMC.SP.1.1-2.a	Analyze patterns of association between two quantities on a scatter plot of bivariate measurement data	Note: Analyze patterns such as clustering, outliers, positive or negative association, linear association, or nonlinear association.	8.SP.A.1	PSD
8.SMC.SP.1.2-1.b	Assess the proximity of data points to a line on a scatter plot in order to determine its linear association	Note: Straight lines are widely used to model relationships between two quantitative variables.	8.SP.A.2	PSD
8.SMC.SP.1.2-2.b	Assess the model fit to a line on a scatter plot by judging the closeness of the data points to a line		8.SP.A.2	PSD
8.SMC.SP.1.3.b	Solve problems by interpreting the slope and intercept of bivariate measurement data by using the equation of a linear model	e.g., In a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height	8.SP.A.3	PSD
8.SMC.SP.1.4-1.c	Analyze patterns of association of categorical data displayed in a two-way frequency and relative frequency table		8.SP.A.4	PSD
8.SMC.SP.1.4-2.c	Construct a two-way table summarizing data on two categorical variables collected from the same subjects		8.SP.A.4	PSD

8.SMC.SP.1.4-3.c	Analyze summary data from a two-way frequency table to describe the association between two categorical variables	e.g., Collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?	8.SP.A.4	PSD
DOMAIN: Standards for Mathematical Practices				
OCS Code:	**Strand: *Solve Problems (MP1)***	**Examples and Notes:**	**CCSS Code:**	**CRS Strand:**
8.SMP.1	**1. Make sense of problems and persevere in solving them.**			
8.SMP.1.c	Make sense of problems and persevere in solving them		MP1	
OCS Code:	**Strand: *Reason (MP2)***	**Examples and Notes:**	**CCSS Code:**	**CRS Strand:**
8.SMP.2	**2. Reason abstractly and quantitatively.**			
8.SMP.2.c	Reason abstractly and quantitatively		MP2	
OCS Code:	**Strand: *Construct Arguments (MP3)***	**Examples and Notes:**	**CCSS Code:**	**CRS Strand:**
8.SMP.3	**3. Construct viable arguments and critique the reasoning of others.**			
8.SMP.3.c	Construct viable arguments and critique the reasoning of others		MP3	
OCS Code:	**Strand: *Model (MP4)***	**Examples and Notes:**	**CCSS Code:**	**CRS Strand:**
8.SMP.4	**4. Model with mathematics.**			
8.SMP.4.c	Model with mathematics		MP4	
OCS Code:	**Strand: *Use Tools (MP5)***	**Examples and Notes:**	**CCSS Code:**	**CRS Strand:**
8.SMP.5	**5. Use appropriate tools strategically.**			
8.SMP.5.c	Use appropriate tools strategically		MP5	
OCS Code:	**Strand: *Attend to Precision (MP6)***	**Examples and Notes:**	**CCSS Code:**	**CRS Strand:**
8.SMP.6	**6. Attend to precision.**			
8.SMP.6.c	Attend to precision		MP6	
OCS Code:	**Strand: *Use Structure (MP7)***	**Examples and Notes:**	**CCSS Code:**	**CRS Strand:**
8.SMP.7	**7. Look for and make use of structure.**			
8.SMP.7.c	Look for and make use of structure		MP7	
OCS Code:	**Strand: *Express Regularity (MP8)***	**Examples and Notes:**	**CCSS Code:**	**CRS Strand:**
8.SMP.8	**8. Look for and express regularity in repeated reasoning.**			
8.SMP.8.c	Look for and express regularity in repeated reasoning		MP8	