Common Core Math Curriculum – Grade 8

ESSENTIAL QUESTIONS	DOMAINS AND CLUSTERS	GRADE 8 SKILL	VOCABULARY	MATHEMATICAL PRACTICES	ASSESSMENT
How do you convert a rational number into a decimal? How do you use a number line to compare the size of two irrational numbers? How do you evaluate a numerical expression with integer exponents? What are the numbers that are perfect squares and non-perfect squares? How do you use scientific notation?	***The Number System 8.NS*** Know that there are numbers that are not rational, and approximate them by rational numbers ***Expressions & Equations 8.EE*** Work with radicals and integer exponents	□ Define rational number. 8.NS.1 □ Define irrational number. 8.NS.1 □ Convert a rational number to a decimal. 8.NS.1 □ Describe the difference between rational and irrational numbers. 8.NS.1 □ Convert a terminating decimal into a fraction. 8.NS.1 □ Convert a repeating decimal into a fraction. 8.NS.1 □ Plot the approximate location of an irrational number on a number line. 8.NS.2 □ Compare the size of two irrational numbers by using a number line. 8.NS.2 □ Estimate the value of an irrational number. 8.NS.2 □ Explain how to get better approximations to irrational numbers. 8.NS.2 □ Divide the numerical expressions with integer exponents with like bases by subtracting the exponents. 8.EE.1 □ Evaluate numerical expressions with integer exponents. 8.EE.1 □ Write a numerical expression with a negative exponent as an equivalent numerical expression with a positive exponent 8.EE.1 □ Multiply numerical expressions with integer exponents with like bases by adding the exponents 8.EE.1 □ Add and subtract and divide numerical expressions with integer exponents. 8.EE.1 □ Calculate the solution to $x^2 = p$, where p is a positive rational number by taking the square root of both sides. 8.EE.2 □ Calculate the solution to $x^3 = p$, where p is a positive rational number by taking the cube root of both sides. 8.EE.2 □ Evaluate a square root of a perfect square. 8.EE.2 □ Name numbers that are perfect squares and non-perfect squares. 8.EE.2 □ Evaluate a cube root of a perfect cube. 8.EE.2 □ Name numbers that are perfect cubes and non-perfect cubes. 8.EE.2 □ Identify that non-perfect squares and non-perfect cubes are irrational numbers (focus on $\sqrt{2}$). 8.EE.2 □ Compare the magnitude (size) of 2 or more numbers written in scientific notation. 8.EE.3 □ Rewrite numbers in standard form in scientific notation. 8.EE.3 □ Expand numbers written in scientific notation into standard form. 8.EE.3 □ Divide numbers in scientific notation to compare their sizes. 8.EE.3	▪ Rational number ▪ Irrational number ▪ Decimal ▪ Repeating decimal ▪ Non—terminating decimal ▪ Approximation ▪ Greater than ▪ Less than ▪ Radical ▪ Square root ▪ Base ▪ Exponent ▪ Integer ▪ Expression ▪ Monomial ▪ Coefficient ▪ Numerical expression ▪ Cube root ▪ Squared ▪ Cubed ▪ Solution ▪ Perfect square ▪ Perfect cube ▪ Exponent ▪ Inverse operation ▪ Index ▪ Rational ▪ Irrational ▪ Scientific Notation ▪ Magnitude ▪ Standard Form ▪ Estimate ▪ Expand ▪ Decimal notation ▪ Powers of 10	Make sense of problems and persevere in solving them. Reason abstractly and quantitatively. Construct viable arguments and critique reasoning of others. Model with mathematics. Use appropriate tools strategically. Attend to precision. Look for and make use of structure. Look for and express regularity in repeated reasoning.	http://www.nctm.org/resources Performance Tasks Investigations

What are the laws of exponents?	Understand the connections between proportional relationships, lines, and linear equations.	❑ Add, subtract, multiply, and divide numbers written in scientific notation, applying laws of exponents 8.EE.4 ❑ Find appropriate units for very large and small quantities. 8.EE.4 ❑ Demonstrate on the calculator and identify that E on the calculator means x 10^a. 8.EE.4 ❑ Identify the slope of a linear relationship from equations, tables, and graphs. 8.EE.5 ❑ Create and label an appropriate quadrant I graph. 8.EE.5 ❑ Describe unit rate as the slope of a graph. 8.EE.5 ❑ Compare two different proportional relationships represented in different ways. 8.EE.5 ❑ Determine the slope of a line by counting the rise over the run of the given line. 8.EE.6 ❑ Explain why the slope of a line is the same for any two points on the graph using rise over run. 8.EE.6 ❑ Explain slope as a constant rate of change (rise over run). 8.EE.6 ❑ Given a line that passes through the origin, write the equation for the line in the form $y = mx$, where the slope is found using rise over run. 8.EE.6 ❑ Given a line that passes the vertical axis at point other than the origin, write the equation for the line in the form $y = mx + b$, where the slope is found using rise over run and b is where the line intercepts the vertical axis. 8.EE.6	▪ Proportions ▪ Unit rate ▪ Slope ▪ Direct variation ▪ Slope ▪ Y-intercept ▪ Slope intercept form ▪ Similar triangles ▪ Non-vertical line ▪ Origin ▪ Constant rate of change	
How do you solve linear equations with one or more solutions?	Analyze and solve linear equations and pairs of simultaneous linear equations.	❑ Solve a linear equation with one solution. 8.EE.7a ❑ Solve a linear equation with infinitely many solutions. 8.EE.7a ❑ Solve a linear equation with no solution. 8.EE.7a ❑ Check the solution to an equation. 8.EE.7a ❑ Explain the differences between one solution, no solution, and infinitely many. 8.EE.7a ❑ Simplify equations using the distributive property, combining like terms, and inverse operations. 8.EE.7b ❑ Solve multi-step linear equations with rational number coefficients 8.EE.7b ❑ Add, subtract, multiply, and divide rational numbers. 8.EE.7b	▪ Equation ▪ Variable ▪ Infinite solution ▪ Linear ▪ No solution ▪ Inverse operation ▪ Distributive property ▪ Combine like terms ▪ Distributive property ▪ Combine like terms ▪ Coefficient	
How do you solve a linear equation algebraically with one solution or no solution?	Analyze and solve linear equations and pairs of simultaneous linear equations.	❑ Define the solution to a linear system of equations as the intersection point on a graph. 8.EE.8a ❑ Graph a system of linear equations. 8EE.8a ❑ Identify the point of intersection to a system of linear equations. 8.EE.8a ❑ Solve a system of linear equations algebraically with one solution. 8.EE.8b ❑ Solve a system of linear equations algebraically with no solution. 8.EE.8b ❑ Solve a system of linear equations algebraically with no solution. 8.EE.8b	▪ Inverse operations ▪ Equations ▪ Rational numbers ▪ System of equations ▪ Solution ▪ Point of intersection	

How do you use the slope formula?		❑ Estimate the solution of a system of linear equations by graphing. 8.EE.8b ❑ Solve simple systems of linear equations by inspection. 8.EE.8b ❑ Write a system of linear equations from a word problem. 8.EE.8.c ❑ Solve a system of linear equations created from a word problem. 8.EE.8c ❑ Graph points on a coordinate plane. 8.EE.8c ❑ Calculate the slope of a line using the slope formula. 8.EE.8c ❑ Create an appropriate coordinate plane based on the constraints of a word problem. 8.EE.8c	▪ Elimination ▪ Substitution ▪ Algebraically ▪ Graphically ▪ One solution ▪ No solution ▪ Infinitely many solutions Systems of equations
	Functions ***8.F*** Define, evaluate, and compare functions.	❑ Identify a function as a one-to-one correspondence 8.F.1 ❑ Find the input/output of function given a value from the domain or a value from the range. 8.F.1 ❑ Plot an ordered pair on a coordinate axis. 8.F.1 ❑ Define the x-coordinate as the input(domain) and the y-coordinate as the output(range). 8.F.1 ❑ Identify a function as a set of ordered pairs on a graph. 8.F.1 ❑ Identify a relation as a function from a graph, equation, or set of ordered pairs. 8.F.1	▪ Intersect ▪ Linear equation ▪ Solution ▪ Variable ▪ Slope/rate of change ▪ Y-intercept ▪ Constraints ▪ Coordinate plane
How do you use functions to model relationships between quantities?		❑ Write the linear function from a table of values. 8.F.2 ❑ Write the linear function from a graph. 8.F.2 ❑ Write the linear function from a verbal description. 8.F.2 ❑ Identify the different properties of a function 8.F.2 ❑ Compare the properties of two functions represented in different ways 8.F.2 ❑ Identify a linear function as y=mx + b. 8.F.3 ❑ Identify functions that are not linear from equations tables, and graphs. 8.F.3 ❑ Identify linear functions as having graphs that are straight lines. 8.F.3 ❑ Identify linear functions in tables. 8.F.3 ❑ Compare/contrast linear vs. non-linear functions represented as equations, tables, and graphs. 8.F.3	▪ Function ▪ Function rule ▪ Input ▪ Output ▪ Ordered pair(x,y) ▪ Coordinate(x,y) ▪ Relation ▪ One-to-one correspondence ▪ Domain ▪ Range
How do you define, evaluate, and compare functions	Use functions to model relationships between quantities	❑ Write a linear function rule for a given relationship 8.F.4 ❑ Calculate the slope/rate of change from a table, graph, equation, or two points 8.F.4 ❑ Calculate the initial value/y-intercept from a table, graph, equation, or two points. 8.F.4 ❑ Describe the slope and y-intercept from a graph or table in terms of the situation. 8.F.4	▪ Vertical line test ▪ Slope(m)/rate of change ▪ Linear function ▪ Table of values ▪ Verbal description
How do you understand congruence and similarity using physical models?		❑ Identify the type of function given a graph. 8.F.5 ❑ Describe the qualitative functional relationship given a graph 8.5.F ❑ Sketch a graph that has been described verbally. 8.F.5	▪ Point of intersection ▪ Parallel ▪ Overlapping ▪ y/x-intercept

	Geometry *8.G*	❑ Translate, rotate, and reflect lines and line segments. 8.G.1a	• non-linear function
		❑ Explain the preservation of the sides of a figure through a given transformation. 8.G.1a	• ordered pairs(x,y)
	Understand congruence and similarity using physical models, transparencies, or geometry software	❑ Identify corresponding parts between a figure and its image using prime notation. 8.G.1a	• Initial value • Slope(m)
		❑ Show that lines are taken to lines and line segments are taken to line segments. 8.G.1a	• Rate of change • Ordered pair(x,y)
		❑ Translate, rotate, and reflect geometric shapes on a coordinate plane. 8.G.1b	• Input
		❑ Measure angles using a protractor8.G.1b	• Output
		❑ Identify corresponding parts between a figure and its image using prime notation. 8.G.1b	• Non-linear • Qualitative
		❑ Show that angles are taken to angles of the same measure. 8.G.1b	• Increase/decrease
		❑ Translate, rotate, and reflect parallel lines on a coordinate plane 8.G.1c	• Independent
		❑ Explain that the slope and distance between two parallel lines will be preserved after a translation, rotation, or reflection of the parallel lines. 8.G.1c	• Dependent • Constant
What is the Pythagorean Theorem?		❑ Identify corresponding lines after a translation, rotation, or reflection, by using prime notation. 8.G.1c	• Rotation • Reflection
		❑ Show that parallel lines are translated, rotated, or reflected parallel lines. 8.G.1c	• Translation • Congruence
		❑ Explain the preservation of congruence when a figure is rotated, reflected, and/or translated. 8.G.2	• Transformation • Corresponding parts
		❑ Describe the sequence of transformations that occurred from the original 2D figure to the image 8.G.2	• Properties • Parallel lines
		❑ Draw a reflection of an object. 8.G.2	• Slope/rate of change
		❑ Draw a translation of an object 8.G.2	• Sequence
		❑ Draw a rotation of an object 8.G.2	• Coordinate
How can the volume of 3-D objects be used to solve real-world problems?		❑ Name corresponding parts in congruent figures. 8.G.2	• Figure
		❑ Dilate a two-dimensional figure using coordinates 8.G.3	• Ordered pair
		❑ Describe the effect of dilating a two-dimensional figure using coordinates. 8.G.3	• Reflect • Translate
	Understand congruence and similarity using physical models, transparencies, or geometry software	❑ Rotate a two-dimensional figure using coordinates8.G.3	• Dilate
		❑ Describe the effect of rotating a two-dimensional figure using coordinates. 8.G.3	• Rotate • Transformation
		❑ Translate a two-dimensional figure using coordinates. 8.G.3	• Prime
		❑ Describe the effect of translating a two-dimensional figure using coordinates 8.G.3	• Image • X-axis
What kind of patterns can be found in bivariate data?		❑ Reflect a two-dimensional figure using coordinates. 8.G.3	
		❑ Describe the effect of reflecting a two-dimensional figure using coordinates. 8.G.3	• Dilation • Transformation
		❑ Explain the preservation of similarity when a figure is dilated, rotated, reflected, and/or translated. 8.G.4	• Similarity • Congruent

		❑ Describe the sequence of transformations that occurred from the original 2D figure to the image to show the similarity. 8.G.4 ❑ Prove/explain why the three angles of a triangle equal 180°. 8.G.5 ❑ Prove/explain why the exterior angle theorem of a triangle8.G.5 ❑ Prove/explain why alternate interior angles are congruent. 8.G.5 ❑ Prove/explain why alternate exterior angles are congruent. 8.G.5 ❑ Prove/explain why corresponding angles are congruent 8.G.5 ❑ Prove/explain why angle-angle criterion works to prove similarity of two triangles. 8.G.5	▪ Similar ▪ Triangle ▪ Similar ▪ Parallel lines ▪ Transversal ▪ Congruent ▪ Supplementary ▪ Linear pair ▪ Corresponding ▪ Vertical ▪ Alternate, exterior, interior angles
	Understand and apply the Pythagorean Theorem	❑ Explain a proof of Pythagorean theorem. (If a triangle is a right triangle, then $a^2 + b^2 = c^2$) 8.G.6 ❑ Explain a proof of the converse of Pythagorean theorem(If $a^2 + b^2 = c^2$, then a triangle is a right triangle) 8.G.6 ❑ Identify the legs and hypotenuse of a right triangle. 8.G.6 ❑ Solve multi-step equations. 8.G.6 ❑ Calculate the length of a leg of a right triangle using Pythagorean theorem. 8.G.7 ❑ Calculate the length of the hypotenuse of a right triangle using Pythagorean theorem. 8.G.7 ❑ Calculate the diagonal of a three-dimensional figure using Pythagorean Theorem. 8.G.7 ❑ Read and interpret a word problem involving Pythagorean Theorem 8.G.7 ❑ Solve word problems involving Pythagorean Theorem. ❑ Solve multi-step equations. 8.G.7 ❑ Identify the legs and hypotenuse of a right triangle. 8.G.7 ❑ Round to given place value. 8.G.7 ❑ Calculate the distance between two points in a coordinate plane using the Pythagorean Theorem. 8.G.8 ❑ Plot points in a coordinate plane 8.G.8 ❑ Solve multi-step equations 8.G.8 ❑ Identify the legs and hypotenuse of a right triangle 8.G.8 ❑ Solve Pythagorean Theorem 8.G.8	▪ Pythagorean theorem ▪ Converse ▪ Proof ▪ Legs ▪ Hypotenuse ▪ Right angle ▪ Square root ▪ Radical ▪ Diagonals ▪ Ordered pair ▪ Coordinate plane ▪ Distance formula
	Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres	❑ Write and solve using the formula for the volume of a cone. 8.G.9 ❑ Write and solve using the formula for the volume of a cylinder 8.G.9 ❑ Write and solve using the formula for the volume of a sphere. 8.G.9 ❑ Solve word problems involving the volume of cones, cylinders, and spheres 8.G.9 ❑ Solve a multi-step equation for a missing variable 8.G.9	▪ Volume ▪ Cone ▪ Cylinder ▪ Sphere ▪ Area ▪ Base ▪ Formula

	Statistics & Probability 8.SP Investigate patterns of association in bivariate data.	❑ Construct a scatter plot for bivariate data. 8.SP.1 ❑ Interpret scatter plots for bivariate data. 8.SP.1 ❑ Describe patterns for clustering of data. 8.SP.1 ❑ Describe patterns for outliers of data. 8.SP.1 ❑ Describe positive/negative association of data. 8.SP.1 ❑ Describe linear/nonlinear association of data. 8.SP.1 ❑ Describe a linear relationship from a scatter plot. 8.SP.2 ❑ Draw/sketch a line on a scatter plot that best fits the data. 8.SP.2 ❑ Choose the line that most appropriately fits the data. 8.SP.2 ❑ Plot ordered pairs on a coordinate plane. 8.SP.2 ❑ Describe the type of correlation from the trend line. 8.SP.2 ❑ Identify the slope and intercept from the equation of a linear model in the context of a problem. 8.SP.3 ❑ Draw logical conclusions using slope and y-intercept of the line. 8.SP.3 ❑ Describe the slope and intercept from the equation of a linear model to solve a problem. 8.SP.3 ❑ Construct a two-way table on two categorical variables collected from the same subjects. 8.SP.4 ❑ Describe patterns of association displayed in a two way table. 8.SP.4 ❑ Draw conclusions about the association between the data (positive association/negative association). 8.SP.4 ❑ Calculate relative frequencies from data given in a two way table. 8.SP.4 ❑ Describe possible associations based on the relative frequencies. 8.SP.4	▪ Scatter plots ▪ Bivariate ▪ Outliers ▪ Positive/negative association ▪ Linear/nonlinear association ▪ Clustering ▪ Ordered pairs ▪ Trend ▪ Correlation ▪ Linear relationship ▪ Independent ▪ Dependent ▪ Trend ▪ Line of best fit ▪ Quantitative data ▪ Slope ▪ Rate of change ▪ Equation of a line ▪ Linear equation ▪ Y-intercept ▪ Two-way table ▪ Frequency ▪ Relative frequency ▪ Association (correlation) ▪ Variable	