Math 8 CCSS Guide

Unit 1 Variables, Expressions and Equations (Chapters 1, 2 and 5)

1.1 Expressions and Variables

1.2 Powers and exponents

1.3 Review Order of operations and variables

1.8 The Coordinate Plane

2.2 Distributive Property

2.3 Simplify variable expressions

2.4 Variables and Equations

2.5 Solve equations using addition and subtraction

2.6 Solve equations using Multiplication and Division

5.6 Using Multiplicative Inverses to Solve Equations

Work with radicals and integer exponents
8. EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.

Analyze and solve linear equations and pairs of simultaneous linear equations
8. EE.7 Solve linear equations in one variable.

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive proper and collecting like terms.

Unit 2 Solving Multi-Step Equations and Inequalities (Ch. 3 and 5)

3.1 Solving 2-step equations

3.2 Solving Equations with Parenthesis

3.2 Solving Equations using like terms

3.3 Solving Equations with variables on both sides

3.4 Solving inequalities using addition/subtraction

3.5 Solving inequalities using multiplication/division

3.6 Solving Multi-Step Inequalities

5.7 Equations with Rational Numbers

CCSS:

Analyze and solve linear equations and pairs of simultaneous linear equations

8. EE.7 Solve linear equations in one variable.

a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive proper and collecting like terms.

Unit 3 Rates, Ratios, and Proportions (ch. 6)

6.1 Ratios and Rates

6.2 Writing Proportions

6.3 Solving Proportions

6.4 Similar and Congruent figures

6.5 Similarity and Measurement

Own Direct Variation

CCSS:

Understand the connections between proportional relationships, lines, and linear equations.

8. EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.

Use functions to model relationships between quantities

8. F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Unit 4 Graphing Linear Equations and Systems (ch. 8)

8.1 Relations and Functions

8.2 Graphing Linear Equations using a table

8.3 Graphing linear Equations using intercepts

8.4 Slope of a line

8.5 Slope-intercept Form

8.6 Scatter plots and best fitting line

8.6 Writing Equations

8.8 Systems of linear Equations

Understand the connections between proportional relationships, lines, and linear equations.
8. EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
8. EE.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y =mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.

Define, evaluate, and compare functions
8. F.1Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output[1].
8. F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, 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.3 Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function A = s^2 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.

Use functions to model relationships between quantities
8. F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
8. F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Investigate patterns of association in bivariate data
8. SP.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
8. SP.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

8. SP.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, 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.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. 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. *For example, 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?*

Unit 5 Exponents and Nonlinear Functions (ch. 4 and 12)

4.5 Exponent Rules

4.6 Negative and Zero Exponents

4.7 Scientific Notation

12.5 Other Rules of Exponents

12.6 Quadratic Functions

12.7 Exponential Growth and Decay

CCSS:

Work with radicals and integer exponents
8. EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.

8. EE.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3 × 10^8 and the population of the world as 7 × 10^9, and determine that the world population is more than 20 times larger.

8. EE.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

Define, evaluate, and compare functions
8. F.1Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output[2].

8. F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, 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.

Use functions to model relationships between quantities
8. F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

8. F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Unit 6 Real Numbers and Pythagorean Theorem (ch. 9)

5.1 Rational numbers

9.1 Square roots

9.4 Real numbers (rational vs. irrational)

9.3 The Pythagorean Thereom

9.5 The Distance Formula

9.6 Special Right Triangles

Know that there are numbers that are not rational, and approximate them by rational numbers.
8. NS.1 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

Understand and apply the Pythagorean Theorem
8. G.6. Explain a proof of the Pythagorean Theorem and its converse.

8. G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

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

Unit 7 Transformations (ch. 13)

13.1 Angle Relationships

13.2 Angles and Parallel lines

13.3 Angles and Polygones

13.4 Translations

13.5 Reflections

13.6 Rotations

13.7 Dilations

Understand congruence and similarity using physical models, transparencies, or geometry software.
8. G.1 Verify experimentally the properties of rotations, reflections, and translations:
- a. Lines are taken to lines, and line segments to line segments of the same length.
- b. Angles are taken to angles of the same measure.
- c. Parallel lines are taken to parallel lines.

8. G.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals why this is so.

Understand congruence and similarity using physical models, transparencies, or geometry software.
8.G.2 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.3 Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.

8.G.4 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.

Unit 8 Volume(ch. 10)

10.4 Circumference and Area of a Circle

10.7 Volume of a Cylinder

10.8 Volume of a Cone

Own Volume of a Sphere

Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.
8. G.9 Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Math 8

Units		Common Core Standards	Vocabulary	Pacing
Unit 1: Variables, Expressions and Equations	1.1 Expressions and Variables 1.2 Powers and exponents 1.3 Order of operations and variables 1.8 The Coordinate Plane 2.2 Distributive Property 2.3 Simplify variable expressions 2.4 Variables and Equations 2.5 Solve equations using addition and subtraction 2.6 Solve equations using Multiplication and Division 5.6 Using Multiplicative Inverses to Solve Equations	**Work with radicals and integer exponents** 8. EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. **Analyze and solve linear equations and pairs of simultaneous linear equations** 8. EE.7 Solve linear equations in one variable. b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive proper and collecting like terms. Assessment: Tests and Quizzes	Expressions Variables Power Base Exponent Formula Order of operations Grouping symbols Coordinate Plane x-axis y-axis Origin Quadrant Ordered Pair x-coordinate y-coordinate Scatter Plot Distributive Property Equivalent Terms Coefficient Constant Like Terms Equation Solution Inverse operation Multiplicative Inverse	18 days

Math 8

Units		Common Core Standards	Vocabulary	Pacing
Unit 2 Solving Multi-Step Equations	3.1 Solving 2-step equations 3.2 Solving Equations with Parenthesis 3.2 Solving Equations using like terms 3.3 Solving Equations with variables on both sides 3.4 Solving inequalities using addition/subtraction 3.5 Solving inequalities using multiplication/division 3.6 Solving Multi-Step Inequalities 5.7 Equations with Rational Numbers	**Analyze and solve linear equations and pairs of simultaneous linear equations** 8. EE.7 Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive proper and collecting like terms. Assessment: Test and Quizzes	Equation Solution Inverse operation Inequality Equivalent	23 days

Math 8

Units		Common Core Standards	Vocabulary	Pacing
Unit 3: Rates, Ratios, and Proportions	6.1 Ratios and Rates 6.2 Writing Proportions 6.3 Solving Proportions 6.4 Similar and Congruent figures 6.5 Similarity and Measurement Own Direct Variation	**CCSS:** **Understand the connections between proportional relationships, lines, and linear equations.** 8. EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. **Use functions to model relationships between quantities** 8. F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. Assessment: Test and Quizzes	Ratio Equivalent ratios Proportion Cross Products Similar figures Corresponding Parts Congruent Figures	18 days

Math 8

Units		Common Core Standards	Vocabulary	Pacing
Unit 4: Graphing Linear Equations and Systems	8.1 Relations and Functions 8.2 Graphing Linear Equations using a table 8.3 Graphing linear Equations using intercepts 8.4 Slope of a line 8.5 Slope-intercept Form 8.6 Scatter plots and best fitting line 8.6 Writing Equations 8.8 Systems of linear Equations	**Understand the connections between proportional relationships, lines, and linear equations.** 8. EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. 8. EE.6 Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y =mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b. **Define, evaluate, and compare functions** 8. F.1Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output[1]. 8. F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, 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.3 Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function A = s^2 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.	Relation Domain Range Input Output Function Vertical Line Test Linear Equation Function Form x-intercept y-intercept Slope Rise Run Slope-Intercept Form Function Notation System of Equations Solution	28 days

		Assessment: Tests and Quizzes		
Units		**Common Core Standards**	**Vocabulary**	**Pacing**

Unit 4: Graphing Linear Equations and Systems cont.		**Use functions to model relationships between quantities** 8. F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. 8. F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. **Investigate patterns of association in bivariate data** 8. SP.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. 8. SP.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. 8. SP.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, 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.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. 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. *For example, 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?* Assessment: Test and Quizzes		

Units		Common Core Standards	Vocabulary	Pacing
Unit 5: Exponents and Nonlinear Functions	4.5 Exponent Rules 4.6 Negative and Zero Exponents 4.7 Scientific Notation 12.5 Other Rules of Exponents 12.6 Quadratic Functions 12.7 Exponential Growth and Decay	**CCSS:** **Work with radicals and integer exponents** 8. EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. 8. EE.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3 × 10^8 and the population of the world as 7 × 10^9, and determine that the world population is more than 20 times larger. 8. EE.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology. **Define, evaluate, and compare functions** 8. F.1Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output[2]. 8. F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, 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.	Exponent Scientific Notation Quadratic function Parabola Nonlinear function Minimum value Maximum value Exponential Function Exponential Growth Exponential Decay	24 days

		Assessment: Tests and Quizzes		
Units		**Common Core Standards**	**Vocabulary**	**Pacing**
Unit 5: Exponents and Nonlinear Functions cont.		**Use functions to model relationships between quantities** 8. F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. 8. F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.		

		Assessment: Test and Quizzes		
Units		**Common Core Standards**	**Vocabulary**	**Pacing**
Unit 6: Real Numbers and Pythagorean Theorem	5.1 Rational numbers 9.1 Square roots 9.4 Real numbers (rational vs. irrational) 9.3 The Pythagorean Thereom 9.5 The Distance Formula 9.6 Special Right Triangles	**Know that there are numbers that are not rational, and approximate them by rational numbers.** 8. NS.1 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. **Understand and apply the Pythagorean Theorem** 8. G.6. Explain a proof of the Pythagorean Theorem and its converse. 8. G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. 8. G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	Real Number Rational Number Irrational Number Square Root Perfect Square Radical Hypotenuse Leg Pythagorean Theorem Converse of Pythagorean Distance Formula Slope Formula	22 days

		Assessment: Tests and Quizzes		
Units		**Common Core Standards**	**Vocabulary**	**Pacing**
Unit 7: Transformations	13.1 Angle Relationships 13.2 Angles and Parallel lines 13.3 Angles and Polygones 13.4 Translations 13.5 Reflections 13.6 Rotations 13.7 Dilations	**Understand congruence and similarity using physical models, transparencies, or geometry software.** 8. G.1 Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines. 8. G.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals why this is so. **Understand congruence and similarity using physical models, transparencies, or geometry software.** 8.G.2 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.3 Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates. 8.G.4 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.	Complementary Angles Supplementary Angles Vertical Angles Transversal Corresponding Angles Alternate Interior Angles Alternate Exterior Angles Interior Angles Exterior Angles Transformation Image Translation Tessellation Reflection Line of Reflection Line symmetry Line of symmetry Rotational symmetry Rotation Center of Rotation Angle of rotation Dilation Center of Dilation Scale Factor	24 days

		Assessment: Tests and Quizzes		
Units		**Common Core Standards**	**Vocabulary**	**Pacing**
Unit 8: Volume	10.4 Circumference and Area of a Circle 10.7 Volume of a Cylinder 10.8 Volume of a Cone Own Volume of a Sphere	**Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.** 8. G.9 Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	Circumference Area Cone Cylinder Sphere Volume Height of cone/cylinder Base Base Area	10 days

		Assessment: Tests and Quizzes		