Mathematics Pacing Guide DRAFT Grade 8

Pacing Guides create a realistic time frame for instruction and assessment. They establish paced student learning expectations and provide a starting point for the implementation of the Common Core State Standards.

These are DRAFT guides for you to use for planning and instruction. Please keep track of pacing, "I can statements", what works, and what doesn't. During the school year, there will be multiple opportunities to get your feedback through steering committee meetings, electronic surveys, online threaded discussions, and feedback forms. **We want your feedback!**

The following tips may be helpful as you begin using the Pacing Guide:

- Introduce 9-week content skills according to the Pacing Guide, incorporating yearlong concepts.
- Once a skill is mastered, continue to practice it.
- Continue to reinforce skills and concepts throughout the year until mastery is achieved.
- Skills can be introduced earlier than listed, but no later, and can be assessed at any point after introduction.
- Compare your current pace to the Pacing Guide and adjust as needed.
- Become familiar with sequencing at previous and subsequent grade levels.
- The Common Core State Standards for your grade are provided at the back of this packet.
- The Pacing Guides and a link to Common Core resources that include vocabulary, examples, and suggested texts can be found on the Lansing School District homepage www.lansingschools.net under Links.

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8th GRADE (First Nine Weeks) Mathematics

The Number System (NS)		
Cluster	**Statement**	
Know that there are numbers that are not rational, and approximate them by rational numbers.	**8.NS.1** I can distinguish between rational and irrational numbers. I can write rational numbers as a decimal expansion. I can convert a repeating decimal expansion into a rational number. I can show informally that every number has a decimal expansion. **8.NS.2** I can compare values of irrational numbers. I can label the approximate location of irrational numbers on a number line.	

Functions (F)	
Cluster	**Statement**
Define, evaluate, and compare functions.	NA
Use functions to model relationships between quantities.	NA

Expressions & Equations (EE)	
Cluster	**Statement**
Work with radicals and integer exponents.	**8.EE.1** I can recall the properties of exponents. I can apply the properties of integer exponents to produce equivalent numerical expressions. **8.EE.2** I can recall small perfect squares and cubes. I can identify small perfect squares, perfect cubes, square roots, and cube roots. **8.EE.3** I can convert between standard form and scientific notation. I can compare numbers written in scientific notation. **8.EE.4** I can solve expressions where numbers are written in both decimal and scientific notation
Understand the connections between proportional relationships, lines, and linear equations.	**8.SP.1** I can construct a scatter plot for data comparing two variables. I can interpret the data from a scatter plot. I can identify patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. **8.SP.2** I can construct a line of best fit to represent the data in a scatter plot.
Analyze and solve linear equations and pairs of simultaneous linear equations.	

8th GRADE (First Nine Weeks)			Mathematics			
	Cluster	Statement		Cluster	Statement	NOTES
Geometry (G)	Understand congruence and similarity using physical models, transparencies, or geometry software.	NA	Statistics & Probability (SP)	Investigate patterns of association in bivariate data.	NA	
Geometry (G)	Understand congruence and similarity using physical models, transparencies, or geometry software.	NA				
Geometry (G)	Understand and apply the Pythagorean Theorem.	NA				
Geometry (G)	Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.	NA				

8th GRADE (Second Nine Weeks) Mathematics

The Number System (NS)

Cluster	Statement
Know that there are numbers that are not rational, and approximate them by rational numbers.	**8.NS.1** I can distinguish between rational and irrational numbers. I can write rational numbers as a decimal expansion. I can convert a repeating decimal expansion into a rational number. I can show informally that every number has a decimal expansion. **8.NS.2** I can compare values of irrational numbers. I can label the approximate location of irrational numbers on a number line.

Functions (F)

Cluster	Statement
Define, evaluate, and compare functions.	**8.F.1** I can recognize a function from a table. I can recognize a function from a graph. **8.F.2** I can compare functions represented by tables, graphs, or verbal descriptions. **8.F.3** I can distinguish between linear and non-linear functions in slope intercept form.
Use functions to model relationships between quantities.	**8.F.4** I can represent a function in table or graph form. I can calculate rate of change between two or more points. I can generate a function rule from a graph or table of values **8.F.5** I can explain verbally the interpretation of a graph. I can construct a graph from a verbal representation.

Expressions & Equations (EE)

Cluster	Statement
Work with radicals and integer exponents.	**8.EE.1** I can recall the properties of exponents. I can apply the properties of integer exponents to produce equivalent numerical expressions. **8.EE.2** I can solve equations using small perfect square and cube roots. **8.EE.3** I can compare numbers written in scientific notation. **8.EE.4** I can solve expressions where numbers are written in both decimal and scientific notation
Understand the connections between proportional relationships, lines, and linear equations.	**8.EE.5** I can graph y = mx. I can determine the slope from a graph. I can compare similar information represented in graphs and equations using the rate of change. **8.EE.6** I can produce an equation in slope-intercept form from a graph.
Analyze and solve linear equations and pairs of simultaneous linear equations.	**8.EE.7a** I can create equations with one variable including those with one solution. I can create equations with infinitely many solutions. I can create equations with no solutions. **8.EE.7b** I can solve linear equations combining like-terms. I can solve linear equations including the use of the distributive property. **8.EE.8a** I can recognize that the solution to a system of linear equations is their point of intersection. **8.EE.8b** I can solve systems of equations that have one solution. I can graph systems of equations. I can estimate the solution of a system of equations from a graph. I can determine if there is one solution, many solutions, or no solution to the system of equations.

8th GRADE (Second Nine Weeks) Mathematics

Geometry (G)

Cluster	Statement
Understand congruence and similarity using physical models, transparencies, or geometry software.	NA
Understand congruence and similarity using physical models, transparencies, or geometry software.	NA
Understand and apply the Pythagorean Theorem.	NA
Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.	NA

Statistics & Probability (SP)

Cluster	Statement
Investigate patterns of association in bivariate data.	**8.SP.3** I can interpret the meaning of the slope and intercept of a linear equation in terms of the situation. I can solve problems using the equation of a linear model. **8.SP.4** I can interpret the data in the two-way table to recognize patterns. I can construct a two-way table from data to determine a relationship between the variables. I can use relative frequencies of the data to describe relationships (positive, negative, or no correlation).

NOTES

8th GRADE (Third Nine Weeks) Mathematics

The Number System (NS)

Cluster	Statement
Know that there are numbers that are not rational, and approximate them by rational numbers.	8.NS.1 I can distinguish between rational and irrational numbers. I can write rational numbers as a decimal expansion. I can convert a repeating decimal expansion into a rational number. I can show informally that every number has a decimal expansion. 8.NS.2 I can compare values of irrational numbers. I can label the approximate location of irrational numbers on a number line.

Functions (F)

Cluster	Statement
Define, evaluate, and compare functions.	**8.F.1** I can recognize a function from a table. I can recognize a function from a graph. **8.F.2** I can compare functions represented by tables, graphs, or verbal descriptions. **8.F.3** I can distinguish between linear and non-linear functions in slope intercept form.
Use functions to model relationships between quantities.	**8.F.4** I can represent a function in table or graph form. I can calculate rate of change between two or more points. I can generate a function rule from a graph or table of values. **8.F.5** I can explain verbally the interpretation of a graph. I can construct a graph from a verbal representation.

Expressions & Equations (EE)

Cluster	Statement
Work with radicals and integer exponents.	**8.EE.1** I can recall the properties of exponents. I can apply the properties of integer exponents to produce equivalent numerical expressions. **8.EE.2** I can solve equations using small perfect square and cube roots. **8.EE.3** I can compare quantities to express how much larger one is compared to the other. **8.EE.4** I can solve expressions where numbers are written in both decimal and scientific notation. I can apply scientific notation to real-world problems to compare quantities and make sense about their relationships.
Understand the connections between proportional relationships, lines, and linear equations.	**8.EE.5** I can compare similar information represented in graphs and equations using the rate of change. **8.EE.6** I can produce an equation in slope-intercept form from a graph.
Analyze and solve linear equations and pairs of simultaneous linear equations.	**8.EE.8a** I can recognize that the solution to a system of linear equations is their point of intersection. **8.EE.8b** I can solve systems of equations that have one solution. I can graph systems of equations. I can estimate the solution of a system of equations from a graph. I can determine if there is one solution, many solutions, or no solution to the system of equations.

8th GRADE (Third Nine Weeks) Mathematics

Geometry (G)

Cluster	Statement
Understand congruence and similarity using physical models, transparencies, or geometry software.	**8.G.1a** I can apply the concept of congruency. I can write congruent statements when comparing two---dimensional figures. **8.G.1c** I can define rotations, reflections, and translations. I can identify rotations, reflections, and translations. I can identify corresponding sides and corresponding angles. I can use prime notation to describe an image after a translation, reflection, or rotation. **8.G.2** I can apply the concept of congruency. I can write congruent statements when comparing two-dimensional figures.
Understand congruence and similarity using physical models, transparencies, or geometry software.	**8.G.3** I can use a scale factor to determine the coordinates of a figure. I can model with coordinates to describe the effects of translation, rotation, and reflections on two-dimensional figures. **8.G.4** I can apply the concept of similarity to write similarity statements. I can reason that a two-dimensional figure is similar to another if the second can be obtained by a sequence of rotations, reflections, translation, or dilation. I can describe the sequence of rotations, reflections, translations, or dilations that exhibits the similarity between two-dimensional figures using words and/or symbols. **8.G.5** I can create a formula for the sum of the interior angles of a polygon. I can create a formula for the measurement of one interior angle of a regular polygon. I can create a method of determining the measurement of an exterior angle of a polygon. I can recognize the relationship of the angles formed when two parallel lines are cut by a transversal. I can determine the measurement of the angles formed by parallel lines that are cut by a transversal. I can apply the angle-angle theorem to prove similar triangles.
Understand and apply the Pythagorean Theorem.	**8.G.6** I can model a representation to prove the Pythagorean Theorem and its converse. **8.G.7** I can implement the PT to find the missing side lengths in right triangles. I can apply my knowledge of PT to real-world situations involving two and three-dimensional figures. **8.G.8** I can calculate the distance between two points in a coordinates system using the PT.
Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.	**8.G.9** I can recall the formulas for volumes of cones, cylinders, and spheres. I can determine and apply the appropriate formulas in order to solve real world problems for a given shape. I can determine the radii or height when given the volume of a cone, cylinder, or sphere.

Statistics & Probability (SP)

Cluster	Statement
Investigate patterns of association in bivariate data.	**8.SP.3** I can interpret the meaning of the slope and intercept of a linear equation in terms of the situation. I can solve problems using the equation of a linear model. **8.SP.4** I can interpret the data in the two-way table to recognize patterns. I can construct a two-way table from data to determine a relationship between the variables. I can use relative frequencies of the data to describe relationships (positive, negative, or no correlation).

8th GRADE (Fourth Nine Weeks) Mathematics

	Cluster	Statement
The Number System (NS)	Know that there are numbers that are not rational, and approximate them by rational numbers.	8.NS.1 I can distinguish between rational and irrational numbers. I can write rational numbers as a decimal expansion. I can convert a repeating decimal expansion into a rational number. I can show informally that every number has a decimal expansion. 8.NS.2 I can compare values of irrational numbers. I can label the approximate location of irrational numbers on a number line.

	Cluster	Statement
Functions (F)	Define, evaluate, and compare functions.	**8.F.1** I can recognize a function from a table. I can recognize a function from a graph. **8.F.2** I can compare functions represented by tables, graphs, or verbal descriptions. **8.F.3** I can distinguish between linear and non-linear functions in slope intercept form.
	Use functions to model relationships between quantities.	**8.F.4** I can represent a function in table or graph form. I can calculate rate of change between two or more points. I can generate a function rule from a graph or table of values. **8.F.5** I can explain verbally the interpretation of a graph. I can construct a graph from a verbal representation.

	Cluster	Statement
Expressions & Equations (EE)	Work with radicals and integer exponents.	**8.EE.1** I can recall the properties of exponents. I can apply the properties of integer exponents to produce equivalent numerical expressions. **8.EE.2** I can solve equations using small perfect square and cube roots. **8.EE.3** I can compare quantities to express how much larger one is compared to the other. **8.EE.4** I can apply scientific notation to real-world problems to compare quantities and make sense about their relationships.
	Understand the connections between proportional relationships, lines, and linear equations.	**8.EE.5** I can compare similar information represented in graphs and equations using the rate of change.
	Analyze and solve linear equations and pairs of simultaneous linear equations.	**8.EE.8a** I can recognize that the solution to a system of linear equations is their point of intersection. **8.EE.8b** I can solve systems of equations that have one solution. I can graph systems of equations. I can estimate the solution of a system of equations from a graph. I can determine if there is one solution, many solutions, or no solution to the system of equations. **8.EE.8c** I can apply my knowledge of equations to construct systems of equation in two variables from real-world problems.

8th GRADE (Fourth Nine Weeks) Mathematics

Geometry (G)

Cluster	Statement
Understand congruence and similarity using physical models, transparencies, or geometry software.	**8.G.1a** I can apply the concept of congruency. I can write congruent statements when comparing two---dimensional figures. **8.G.1c** I can define rotations, reflections, and translations. I can identify rotations, reflections, and translations. I can identify corresponding sides and corresponding angles. I can use prime notation to describe an image after a translation, reflection, or rotation. **8.G.2** I can apply the concept of congruency. I can write congruent statements when comparing two-dimensional figures.
Understand congruence and similarity using physical models, transparencies, or geometry software.	**8.G.3** I can use a scale factor to determine the coordinates of a figure. I can model with coordinates to describe the effects of translation, rotation, and reflections on two-dimensional figures. **8.G.4** I can apply the concept of similarity to write similarity statements. I can reason that a two-dimensional figure is similar to another if the second can be obtained by a sequence of rotations, reflections, translation, or dilation. I can describe the sequence of rotations, reflections, translations, or dilations that exhibits the similarity between two-dimensional figures using words and/or symbols. **8.G.5** I can create a formula for the sum of the interior angles of a polygon. I can create a formula for the measurement of one interior angle of a regular polygon. I can create a method of determining the measurement of an exterior angle of a polygon. I can recognize the relationship of the angles formed when two parallel lines are cut by a transversal. I can determine the measurement of the angles formed by parallel lines that are cut by a transversal. I can apply the angle-angle theorem to prove similar triangles.
Understand and apply the Pythagorean Theorem.	**8.G.6** I can model a representation to prove the Pythagorean Theorem and its converse. **8.G.7** I can implement the PT to find the missing side lengths in right triangles. I can apply my knowledge of PT to real-world situations involving two and three-dimensional figures. **8.G.8** I can calculate the distance between two points in a coordinates system using the PT.
Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.	**8.G.9** I can recall the formulas for volumes of cones, cylinders, and spheres. I can determine and apply the appropriate formulas in order to solve real world problems for a given shape. I can determine the radii or height when given the volume of a cone, cylinder, or sphere.

Statistics & Probability (SP)

Cluster	Statement
Investigate patterns of association in bivariate data.	**8.SP.3** I can interpret the meaning of the slope and intercept of a linear equation in terms of the situation. I can solve problems using the equation of a linear model. **8.SP.4** I can interpret the data in the two-way table to recognize patterns. I can construct a two-way table from data to determine a relationship between the variables. I can use relative frequencies of the data to describe relationships (positive, negative, or no correlation).

Mathematics | Grade 8

In Grade 8, instructional time should focus on three critical areas: (1) formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

(1) Students use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems. Students recognize equations for proportions ($y/x = m$ or $y = mx$) as special linear equations ($y = mx + b$), understanding that the constant of proportionality (m) is the slope, and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input or x-coordinate changes by an amount A, the output or y-coordinate changes by the amount $m \cdot A$. Students also use a linear equation to describe the association between two quantities in bivariate data (such as arm span vs. height for students in a classroom). At this grade, fitting the model, and assessing its fit to the data are done informally. Interpreting the model in the context of the data requires students to express a relationship between the two quantities in question and to interpret components of the relationship (such as slope and y-intercept) in terms of the situation.

Students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions of the original equation. Students solve systems of two linear equations in two variables and relate the systems to pairs of lines in the plane; these intersect, are parallel, or are the same line. Students use linear equations, systems of linear equations, linear functions, and their understanding of slope of a line to analyze situations and solve problems.

(2) Students grasp the concept of a function as a rule that assigns to each input exactly one output. They understand that functions describe situations where one quantity determines another. They can translate among representations and partial representations of functions (noting that tabular and graphical representations may be partial representations), and they describe how aspects of the function are reflected in the different representations.

(3) Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines. Students understand the statement of the Pythagorean Theorem and its converse, and can explain why the Pythagorean Theorem holds, for example, by decomposing a square in two different ways. They apply the Pythagorean Theorem to find distances between points on the coordinate plane, to find lengths, and to analyze polygons. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.

Grade 8 Overview

The Number System

- **Know that there are numbers that are not rational, and approximate them by rational numbers.**

Expressions and Equations

- **Work with radicals and integer exponents.**
- **Understand the connections between proportional relationships, lines, and linear equations.**
- **Analyze and solve linear equations and pairs of simultaneous linear equations.**

Functions

- **Define, evaluate, and compare functions.**
- **Use functions to model relationships between quantities.**

Geometry

- **Understand congruence and similarity using physical models, transparencies, or geometry software.**
- **Understand and apply the Pythagorean Theorem.**
- **Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.**

Statistics and Probability

- **Investigate patterns of association in bivariate data.**

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

The Number System 8.NS

Know that there are numbers that are not rational, and approximate them by rational numbers.

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.
2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*

Expressions and Equations 8.EE

Work with radicals and integer exponents.

1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.*
2. Use square root and cube root symbols to 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 small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
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.*
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.

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

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.*
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.

Analyze and solve linear equations and pairs of simultaneous linear equations.

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 property and collecting like terms.

8. Analyze and solve pairs of simultaneous linear equations.

   a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

   b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.*

   c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*

Functions 8.F

Define, evaluate, and compare functions.

1. Understand 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]

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.*

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.

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.

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.

Geometry 8.G

Understand congruence and similarity using physical models, transparencies, or geometry software.

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.

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.

[1]Function notation is not required in Grade 8.

3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
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.
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 sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*

Understand and apply the Pythagorean Theorem.

6. Explain a proof of the Pythagorean Theorem and its converse.
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. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Statistics and Probability 8.SP

Investigate patterns of association in bivariate data.

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.
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.
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.*
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?*