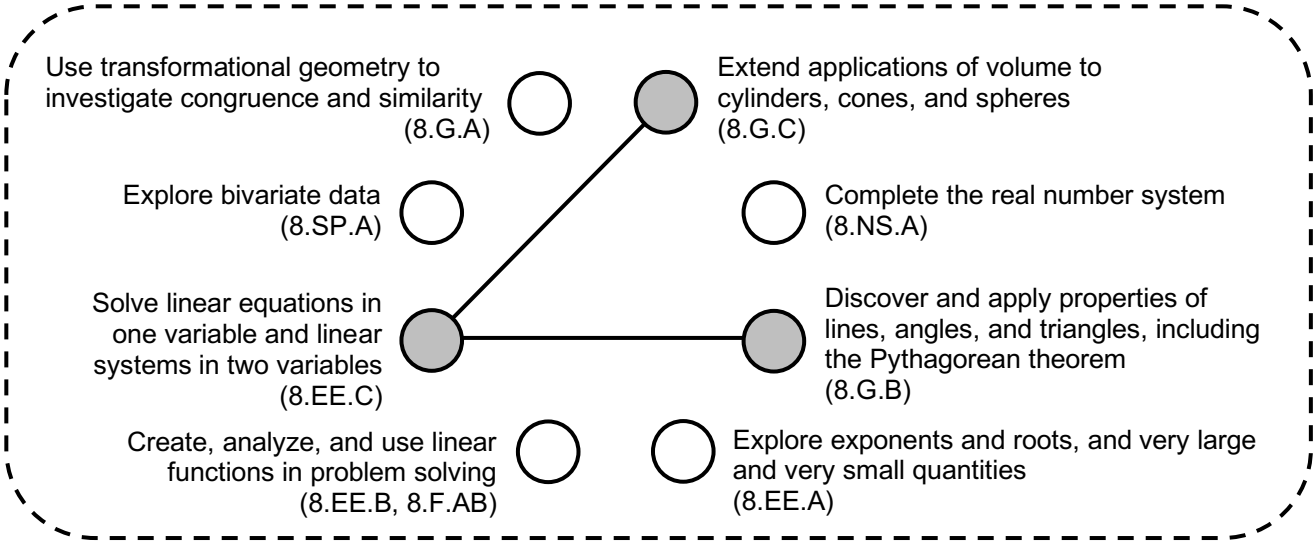
GRADE 8 – UNIT 1: Big Ideas and Connections

The Center for Mathematics and Teaching is dedicated to igniting and nurturing passion for mathematics in middle school students. We see the classroom as a place of joy and wonder, collaboration and purpose, perseverance and empowerment. We want all students to succeed in mathematics, as they explore its beauty in patterns, concepts, connections, and applications.

MathLinks: Grade 8 is organized around eight big ideas. This graphic provides a snapshot of the ideas in Unit 1 and their connections to each other.



These ideas build on past work and prepare students for the future. Some of these include:

Prior Work	What's Ahead
• Use a protractor (4.MD.C) • Solve problems involving angle measures (7.G.AB) • Find areas of triangles and quadrilaterals (6.G.A, 7.G.AB) • Find volumes of prisms (6.G.A, 7.G.B) • Find circumference and area of circles (7.G.B) • Solve problems using numerical and algebraic expressions and equations (6.EE.AB, 7.EE.AB) • Perform operations with rational numbers (7.NS.A) • Solve equations in one variable • (6.EE.B, 7.EE.AB)	• Analyze and solve linear equations (8.EE.C, HS) • Solve problems involving surface area and volume (HS) • Explain volume formulas and use them to solve problems (HS) • Apply geometric concepts in modeling situations (HS)

GRADE 8 – UNIT 2: Big Ideas and Connections

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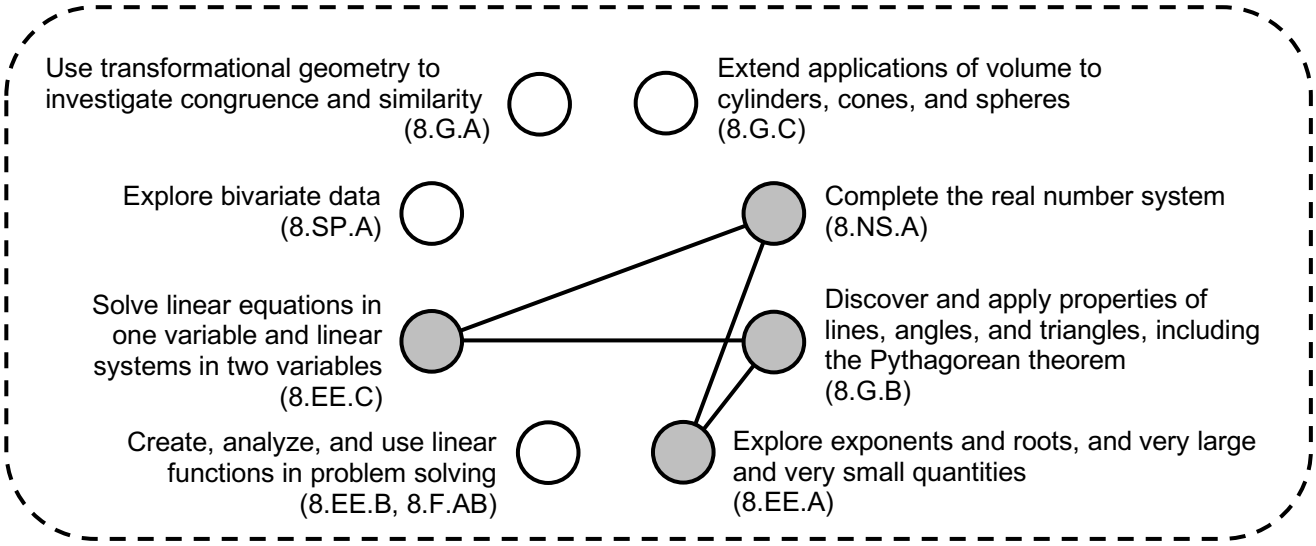
MathLinks: Grade 8 is organized around eight big ideas. This graphic provides a snapshot of the ideas in Unit 2 and their connections to each other.



These ideas build on past work and prepare students for the future. Some of these include:

Prior Work	What's Ahead
• Generate and analyze patterns (4.OA.C, 5.OA.B) • Classify triangles (4.G.A) • Understand the place value system (5.NBT.A) • Graph points in the coordinate plane (5.G.A) • Extend number system to include rational numbers (6.NS.C, 7.NS.A) • Use the division algorithm fluently (6.NS.B.2) • Write and evaluate expressions that include exponents (6.EE.A) • Manipulate linear expressions with rational coefficients (7.EE.AB)	• Work with radicals and integer exponents (8.EE.A) • Solve equations involving squares and square roots (HS) • Extend understanding of rational and irrational numbers (HS) • Expand number system to include complex numbers (HS) • Use complex number system to find roots of polynomial equations (HS) • Prove the converse of the Pythagorean theorem using theorems about triangles or trigonometry (HS) • Prove the Pythagorean identity using trigonometry (HS)

GRADE 8 – UNIT 3: Big Ideas and Connections

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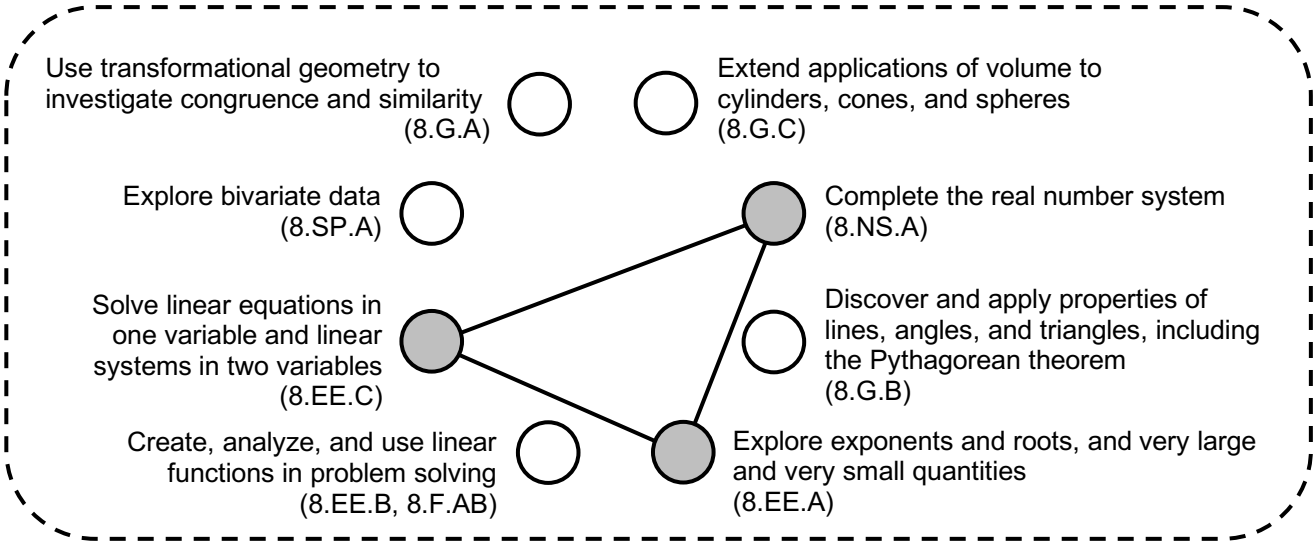
MathLinks: Grade 8 is organized around eight big ideas. This graphic provides a snapshot of the ideas in Unit 3 and their connections to each other.



These ideas build on past work and prepare students for the future. Some of these include:

Prior Work	What's Ahead
• Understand the place value system (5.NBT.A) • Apply and extend understandings of arithmetic to algebraic expressions (including whole number exponents) (6.EE.A) • Use properties to generate equivalent expressions (7.EE.A) • Work with squares and square roots (8.EE.A)	• More work with radicals and integer exponents (HS) • More work solving equations involving squares and square roots (HS) • Extend understanding of rational and irrational numbers (HS) • Expand the number system to include complex numbers (HS) • Use the complex number system to find roots of polynomial equations (HS)

GRADE 8 – UNIT 4: Big Ideas and Connections

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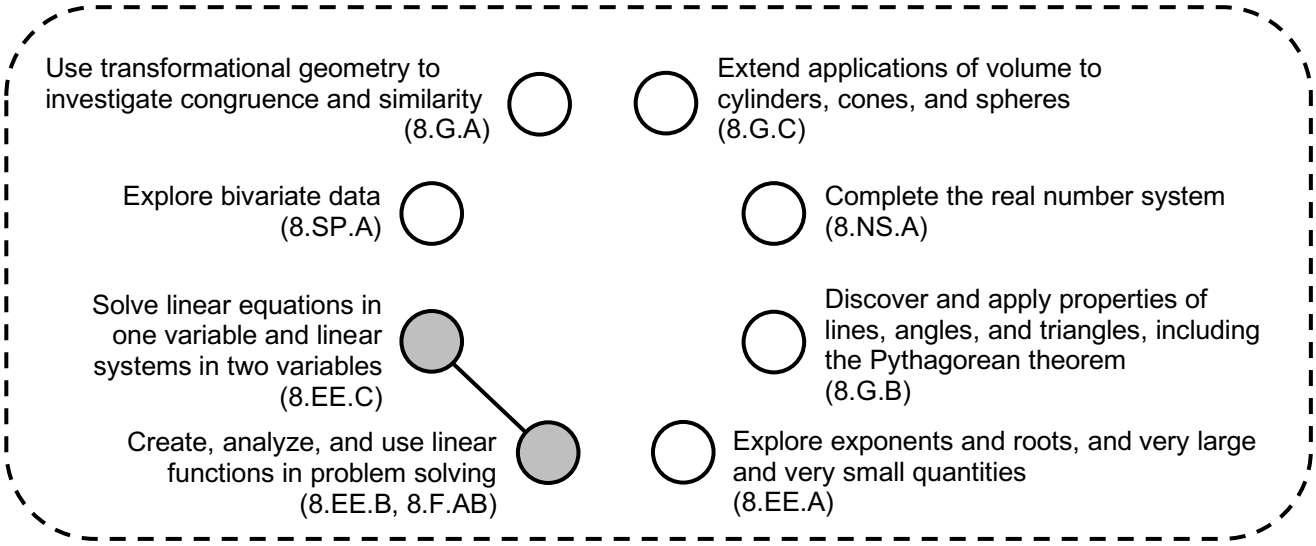
MathLinks: Grade 8 is organized around seven big ideas. This graphic provides a snapshot of the ideas in Unit 4 and their connections to each other.



These ideas build on past work and prepare students for the future. Some of these include:

Prior Work	What's Ahead
• Generate number and shape patterns from a rule (4.OA.C) • Generate two patterns and simultaneously graph ordered pairs, comparing corresponding coordinates (5.OA.B, 5.G.A) • Explore ratios and rates using multiple representations (6.RP.A) • Recognize when a representation illustrates a proportional relationship (7.RP.A)	• Formally define slope of a line (8.F.A) • Develop the slope-intercept form of a line (8.F.A) • Introduction to transformational geometry as an example of a function (8.F.A, 8.G.A) • Deepen understanding of functions (HS) • Study a variety of classic mathematical relationships, including linear, quadratic, exponential, and trigonometric functions (HS)

GRADE 8 – UNIT 5: Big Ideas and Connections

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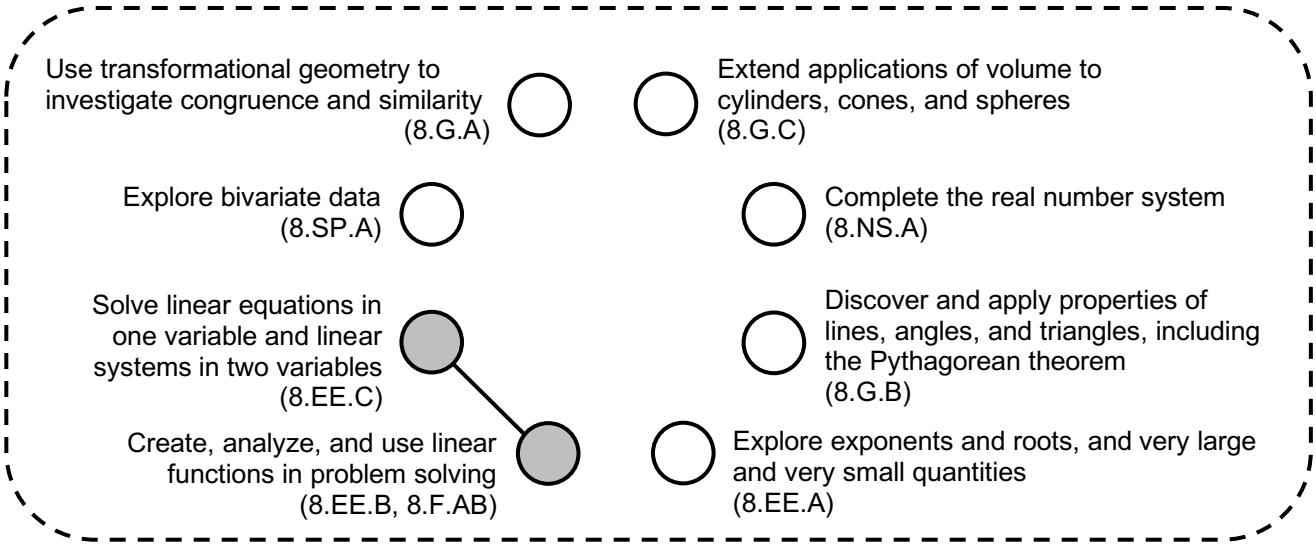
MathLinks: Grade 8 is organized around eight big ideas. This graphic provides a snapshot of the ideas in Unit 5 and their connections to each other.



These ideas build on past work and prepare students for the future. Some of these include:

Prior Work	What's Ahead
• Represent and analyze quantitative relationships between dependent and independent variables (6.EE.C) • Explore equivalent ratios and proportional relationships (6.RP.A, 7.RP.A) • Reason about and solve one-variable equations. Write equations in the form $y = mx$ (6.EE.B) • Solve real-life and mathematical problems using algebraic equations. Write equations in the form $y = mx + b$ (7.EE.B)	• Solve linear equations in one variable (8.EE.C, HS) • Solve systems of linear equations (8.EE.C, HS) • Explore nonlinear functions and non-functions (HS)

GRADE 8 – UNIT 6: Big Ideas and Connections

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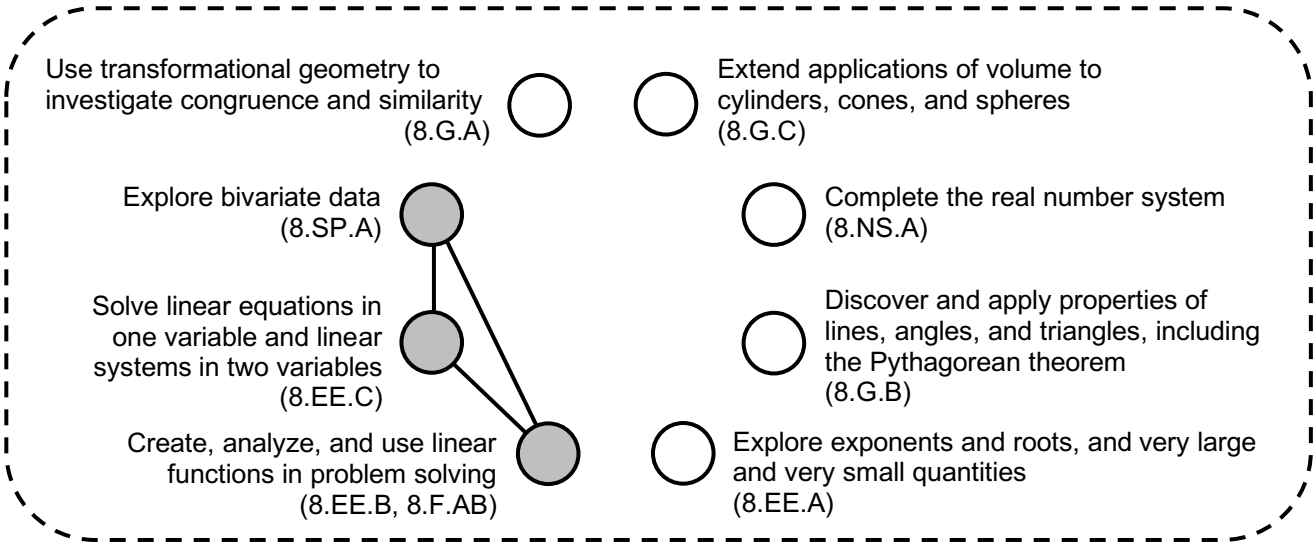
MathLinks: Grade 8 is organized around eight big ideas. This graphic provides a snapshot of the ideas in Unit 6 and their connections to each other.



Prior Work	What's Ahead
• Work with univariate numerical/measurement and categorical data and statistics, such as calculating measures of center and spread (6.SP.AB) • Sample with univariate data (7.SP.A) • Calculate percentages (6.RP.A,, 7.RP.A) • Reason about and solve equations in one variable (6.EE.B) • Write equations in the form $y = mx$ and $y = mx + b$ (6.EE.B, 7.EE.B, 8.EE.C) • Use functions to model relationships between quantities (8.F.B)	• Continue the work with univariate data started in middle school (data displays, using measures of center and spread to analyze data, attend to the effects of potential outliers), and extend it to learning about standard deviation (HS) • Continue the work with bivariate data started in middle school (exploring data in two-way tables), represent data on scatter plots, and look for associations with lines of best fit (HS) • Learn about the correlation coefficient and use technology to interpret it (HS) • Continue the work with randomness in statistical experiments, and make inferences and justify conclusions from experiments and surveys (HS)

GRADE 8 – UNIT 7: Big Ideas and Connections

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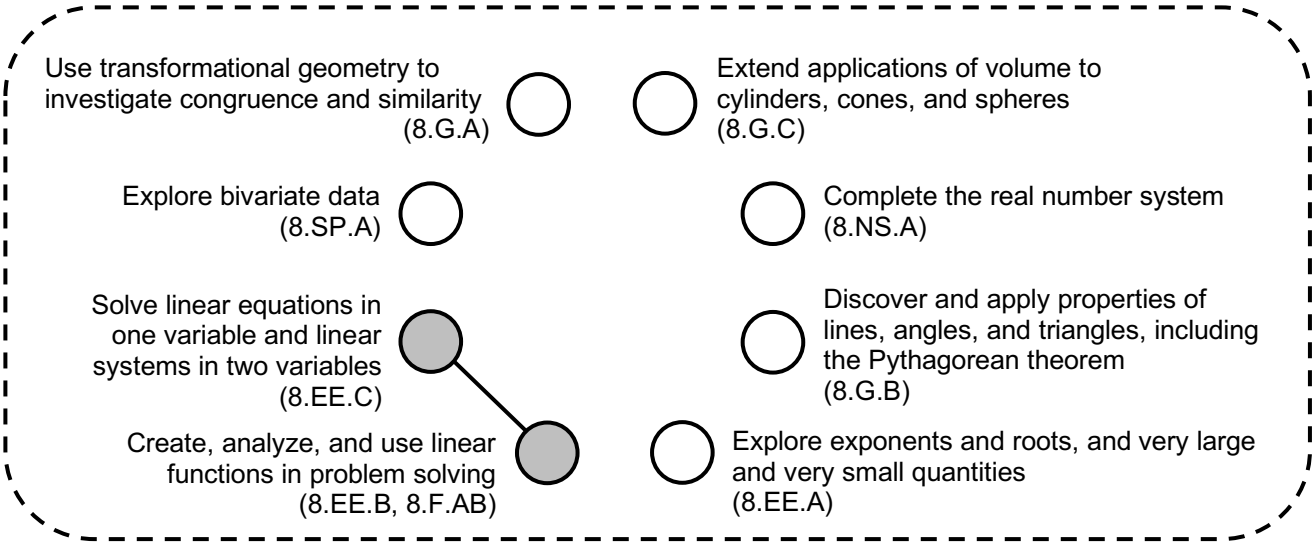
MathLinks: Grade 8 is organized around eight big ideas. This graphic provides a snapshot of the ideas in Unit 7 and their connections to each other.



These ideas build on past work and prepare students for the future. Some of these include:

Prior Work	What's Ahead
• Learn about variables and work with algebraic expressions, equations, and inequalities (6.EE.B, 7.EE.B) • Write and solve equations (6.EE.B, 7.EE.B) • Reason about and solve one-variable equations. Write equations in the form $y = mx$ (6.EE.B) • Solve real-life and mathematical problems using algebraic equations. Write equations in the form $y = mx + b$ (7.EE.B) • Define, evaluate, and compare linear functions (8.F.A) • Use functions to model relationships between quantities (8.F.B) • Informally fit a straight line to scatter plots that suggest a linear association (8.SP.A)	• Solve linear equations with non-integer coefficients and constants using algebraic procedures (8.EE.C) • Analyze and solve pairs of simultaneous linear equations algebraically (8.EE.C) • Understand the connections between proportional relationships, lines, and linear equations. Connect equations in the forms $y = mx$ and $y = mx + b$ to similar triangles in the coordinate plane (8.EE.B) • Solve more complicated equations and inequalities in one variable, including equations with coefficients represented by letters, and quadratic equations (HS) • Solve systems of linear equations using other methods, or systems that includes a linear and a quadratic equation (HS)

GRADE 8 – UNIT 8: Big Ideas and Connections

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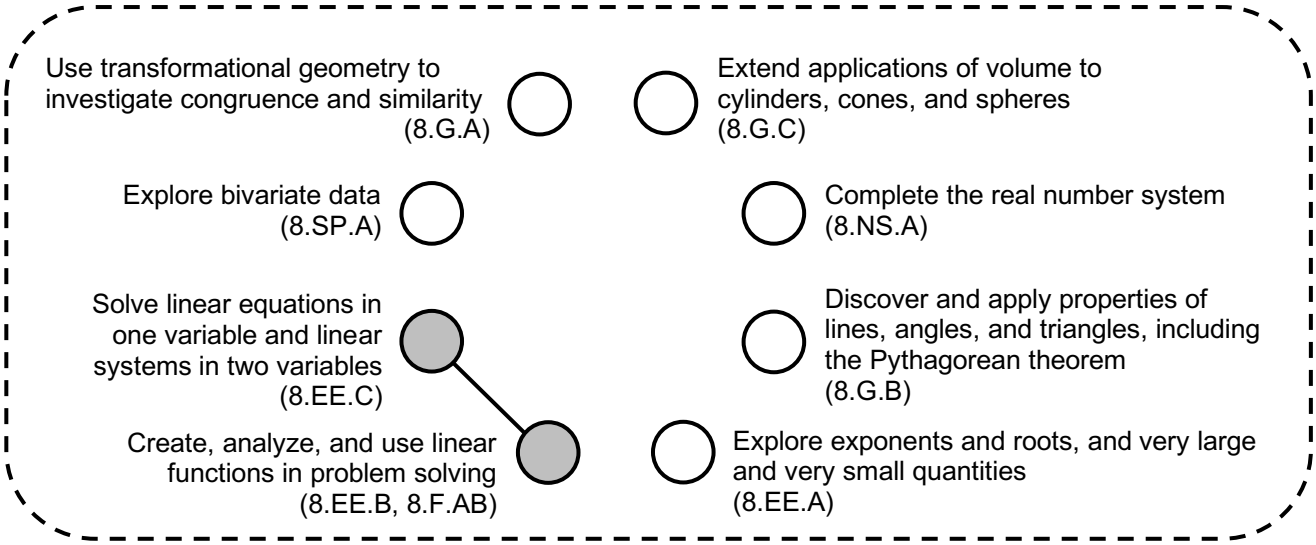
MathLinks: Grade 8 is organized around eight big ideas. This graphic provides a snapshot of the ideas in Unit 8 and their connections to each other.



These ideas build on past work and prepare students for the future. Some of these include:

Prior Work	What's Ahead
• Learn about variables and work with algebraic expressions, equations, and inequalities (6.EE.ABC, 7.EE.B, 8.EE.C) • Write and solve equations (6.EE.B, 7.EE.B, 8.EE.C) • Reason about and solve one-variable equations. Write equations in the form $y = mx$ (6.EE.B) • Solve real-life and mathematical problems using algebraic equations. Write equations in the form $y = mx + b$ (7.EE.B) • Define, evaluate, and compare linear functions (8.F.A) • Use functions to model relationships between quantities (8.F.B) • Solve equations with integer coefficients and constants using a manipulative, a picture, and algebraic procedures (8.EE.C)	• Understand the connections between proportional relationships, lines, and linear equations. Connect equations in the forms $y = mx$ and $y = mx + b$ to similar triangles in the coordinate plane (8.EE.B) • Investigate patterns of association in bivariate data. Informally fit a straight line to scatter plots that suggest a linear association (8.SP.A) • Solve systems of linear equations using other methods, or systems that includes a linear and a quadratic equation (HS) • Use function notation, and explore nonlinear functions and non-functions (HS) • Build new functions from existing functions (HS) • Work with quadratic, exponential, and trigonometric functions (HS)

GRADE 8 – UNIT 9: Big Ideas and Connections

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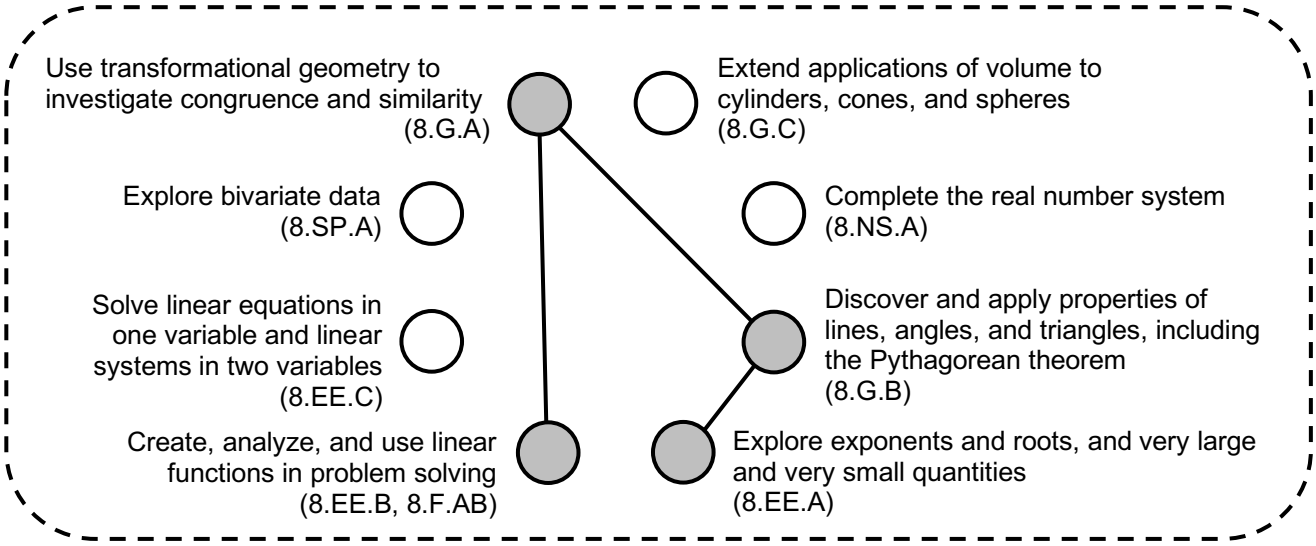
MathLinks: Grade 8 is organized around eight big ideas. This graphic provides a snapshot of the ideas in Unit 9 and their connections to each other.



These ideas build on past work and prepare students for the future. Some of these include:

Prior Work	What's Ahead
• Use correct geometry vocabulary and notation (6.G.A, 7.G.A, 8.G.A) • Work with lengths of segments and angle measures (4.MD.A, 7.G.A, 8.G.A) • Formally introduce the meaning of function (8.F.A) • Understand and use the Pythagorean theorem (8.G.B)	• Continue to use correct geometry vocabulary and notation (8.G.A) • Continue to work with lengths of segments and angle measures (8.G.A) • Formally introduce dilations (8.G.A) • Study geometry from a transformation perspective (HS)

GRADE 8 – UNIT 10: Big Ideas and Connections

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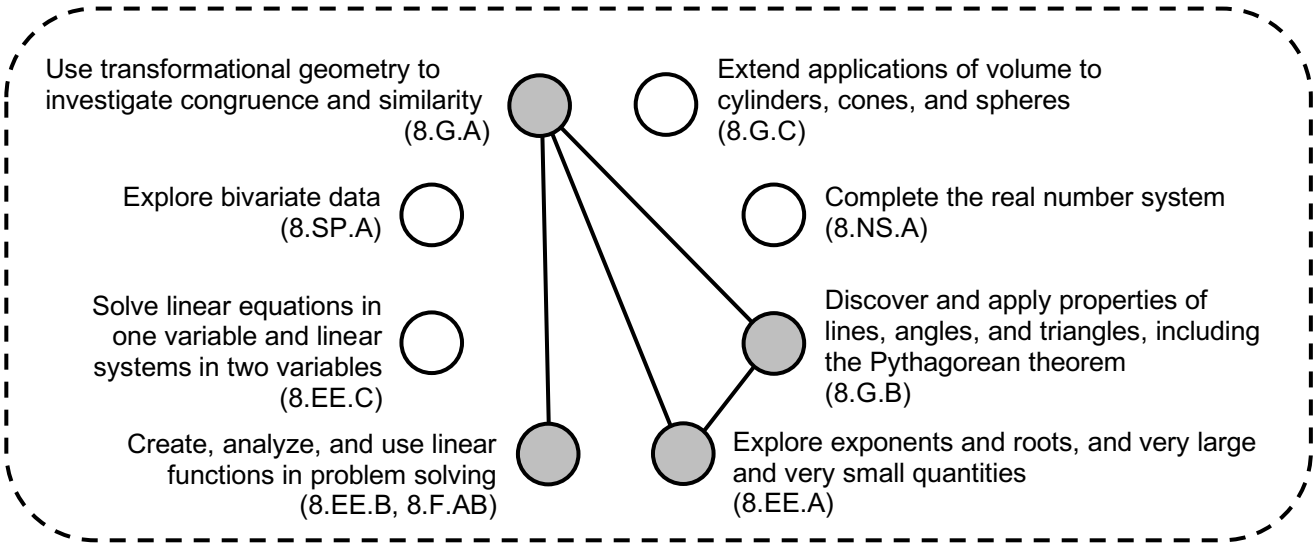
MathLinks: Grade 8 is organized around eight big ideas. This graphic provides a snapshot of the ideas in Unit 10 and their connections to each other.



These ideas build on past work and prepare students for the future. Some of these include:

Prior Work	What's Ahead
• Use correct geometry vocabulary and notation (6.G.A, 7.G.A, 8.G.A) • Work with lengths of segments and angle measures (4.MD.A, 7.G.A, 8.G.A) • Understand scale factors and proportionality (7.RP.A) • Formally introduce the meanings of function, linear function, and slope of a line (8.F.A) • Understand and use the Pythagorean theorem (8.G.B) • Learn about transformations and rigid motions to establish congruence of figures in the plane (8.G.A)	• Generalize Pythagorean theorem for non-right triangles by the Law of Cosines (HS) • Use the Pythagorean theorem to derive the equation of a circle (HS) • Apply the Pythagorean theorem when problem solving (HS) • Study geometry from a transformation perspective (HS)