

Glen Ridge Public Schools –Mathematics Curriculum

Course Title: Algebra I Concepts 8

Subject: Mathematics

Grade Level: 8th Grade

Duration: One Academic School Year

Prerequisite: Pre Algebra or Advanced Pre-Algebra

Elective or Required: Required Course Content

Mathematics Mission Statement:

Mathematics is an integral part of our lives. Students must be actively involved in their mathematics education through the use of modeling and demonstrating the ability to persevere through problem solving. The mathematics curricula will emphasize critical thinking skills through a balance of logic and reasoning, attention to precision by utilizing patterns and structure, and bridging these ideas to cross-curricular learning. Students will be engaged and challenged in a student-centered learning environment that is developmentally appropriate and will communicate mathematical ideas, both in a verbal and written form. Through effectively applying hands-on manipulatives, basic computation skills and the use of technical writing to justify their processes, students will critique the work of themselves and others.

Course Description:

Algebra Concepts students will develop fundamental mathematical ideas and methods through a student-centered based curricula. The ultimate goal of this course is to give the student a foundation for exploring and understanding algebra and geometry. Concepts covered in this course include basic operations and properties of real numbers, measurement on a plane and in space, data analysis, linear equations, graphing, problem solving, functions, and deductive reasoning.

Author: Alyssa Angelo & Felicia Andorko

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Algebra I Concepts 8

Unit #1: Number Sense

Approximate # of Weeks: 6 weeks

Essential Questions:

- What are the characteristics of a rational number?
- What is an irrational number?
- What is a perfect square?
- How can you find decimal approximations of square roots that are irrational?
- How can you simplify a radical expression?
- How can you multiply two powers that have the same base?
- How can you simplify expressions containing exponents?
- How do we rewrite expressions containing negative exponents?
- How can you read and use numbers written in scientific notation?
- How do you multiply or divide numbers written in scientific notation?
- How do you add or subtract numbers written in scientific notation?

New Jersey Learning Standards:

- 7.NS.1,2,3
- 8.NS.1,2
- 8.EE.1-4
- NCTM Mathematical Practices

Upon completion of this unit students will be able to:

- Identify and order rational numbers
- Identify and order irrational numbers
- Find perfect squares
- Approximate irrational square roots
- Simplify radical expressions
- Multiply powers with the same base
- Raise a power to a power
- Divide powers with the same base
- Define a number to the zero power
- Rewrite negative powers
- Read and write numbers in scientific notation
- Multiply and divide numbers in scientific notation
- Add and subtract numbers in scientific notation

Interdisciplinary Standards (NJCCCS.org)

- **Standard 9.1 21st-Century Life & Career Skills**

All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

- **Standard 8.2 – Technology Education**

All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world as they relate to the individual, society, and the environment.

- **Standard 5.1 Science Practices**

All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.

Activities/ Technology:

- Google Classroom
- Video tutorials (Virtual Nerd)
- Number Line (approximating square roots)
- Flashcards square and cube roots
- Converting between different number representations activity
- Card Sort cube and square roots
- Math XL

Enrichment Activities:

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Practice C - Level Worksheets
- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation:

Technology Assessment	Closure Assessments	Summative Assessments	Formative Assessments
Smart Board Lessons	Entry/ Exit Slips	Unit Quizzes	Think/Pair/Share

Calculator Labs	Thumbs Up/ Thumbs Down	Quarterly Assessments	Entry/ Exit Slips
Google Classroom Exit Slips	Dry Erase Boards	Unit Projects	Whiteboards
Online Quizzes	Think/Pair/Share	Quiz Games/ Board Games (Kahoot)	Classwork/ Homework
	Revisit Essential Questions (Objectives)	Self Assessments	Real World Applications
			Manipulatives
			Open Ended Questions
			Verbal Assessment
			Rhetorical Questions
			Unit Projects
			Error Analysis
			Math Games
			Notebook/ Binder Quiz

Resources/ Online Resources:

- Teacher Webpage
- Google Classroom
- Math XL
- *Big Ideas Math Grade 8*, Common Core 2014 Regular Pathway
- *Mathematics Grade 8*, Holt McDougal
- Technology:
 - Khan Academy
 - Learn Zillion
 - Big Idea Math (online)
 - Purple Math

Unit #2: Geometry

Approximate # of Weeks: 5 weeks

Essential Questions:

- How do you derive the Pythagorean Theorem?
- How does the Pythagorean Theorem work?
- How can you apply the Pythagorean Theorem in order to find the distance between two points?
- What is a transformation?
- Does a transformation maintain the same side lengths and angles?
- How do the x and y coordinates change in translations?
- How do the x and y coordinates change in reflections?
- How do the x and y coordinates change in rotations?
- How do the x and y coordinates change in dilations?
- How can you find the missing angles of a triangle?
- How can you use properties of parallel lines to solve real- life problems?

New Jersey Learning Standards:

- 8.G.2,3,5,6,7,8
- 8.NS.1,2
- 8.EE.2
- NCTM Mathematical Practices

Upon completion of this unit students will be able to:

- Find missing sides of a right triangle
- Apply the Pythagorean Theorem to find the distance between two points
- Apply the Pythagorean Theorem to solve real world problems
- Identify different transformations (translation, reflection, rotation, and dilation)
- Graph different transformations and identify the effect on the x & y coordinates
- Find missing interior and exterior angles of triangles
- Find the measure of angles using parallel lines and a transversal

Interdisciplinary Standards (NJCCCS.org)

- **Standard 6.3 Active Citizenship in the 21st Century**

All students will acquire the skills needed to be active, informed citizens who value diversity and promote cultural understanding by working collaboratively to address the challenges that are inherent in living in an interconnected world.

- **Standard 8.2 – Technology Education**

All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world as they relate to the individual, society, and the environment.

- **Standard 9.1 21st-Century Life & Career Skills**

All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

- **Standard 9.3 - Career Awareness, Exploration, and Preparation**

All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

Activities/ Technology:

- Google Classroom
- Video tutorials (Virtual Nerd)
- Pythagorean Theorem exploration activity
- Midpoint exploration activity
- Transformations exploration activity (tracing paper)
- Parallel lines tape activity
- Triangle sum exploration
- Scavenger Hunt triangle activity
- Math XL

Enrichment Activities:

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Practice C - Level Worksheets
- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation:

Technology Assessment	Closure Assessments	Summative Assessments	Formative Assessments
Smart Board Lessons	Entry/ Exit Slips	Unit Quizzes	Think/Pair/Share
Calculator Labs	Thumbs Up/ Thumbs Down	Quarterly Assessments	Entry/ Exit Slips
Google Classroom Exit Slips	Dry Erase Boards	Unit Projects	Whiteboards

Online Quizzes	Think/Pair/Share	Quiz Games/ Board Games (Kahoot)	Classwork/ Homework
	Revisit Essential Questions (Objectives)	Self Assessments	Real World Applications
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			Open Ended Questions
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			Rhetorical Questions
			Unit Projects
			Error Analysis
			Math Games
			Notebook/ Binder Quiz

Resources/ Online Resources:

- Teacher Webpage
- Google Classroom
- Math XL
- *Big Ideas Math Grade 8*, Common Core 2014 Regular Pathway
- *Mathematics Grade 8*, Holt McDougal
- Technology:
 - Khan Academy
 - Learn Zillion
 - Big Idea Math (online)
 - Purple Math

Unit #3: Functions

Approximate # of Weeks: 8 weeks

Essential Questions:

- What is a function?
- How do you identify a function?
- How can you find the domain and range of a function?

- How can you decide whether the domain of a function is discrete or continuous?
- How do you graph a function?
- How can we use similar triangles to identify slope?
- How do we graph lines in slope-intercept form?
- How do you graph a line written in standard form?
- How do you classify functions as linear or nonlinear?
- How can you write an equation of a line when you are given the table, graph, or description?
- How can you write an equation of a line when you are given the slope and a point?
- How can you write an equation of a line when you are given two points on the line?
- How can we use parallel and perpendicular line relationships to write the equation of a line?

New Jersey Learning Standards:

- 8.F.1-5
- 8.EE.5-8
- NCTM Mathematical Practices

Upon completion of this unit students will be able to:

- Complete an input-output table by finding the pattern
- Identify the difference between a function and relation
- Find domain and range of functions and relations
- Determine if a domain is discrete or continuous
- Graph functions on the coordinate plane by completing an input-output table
- Calculate slope by using similarity of triangles
- Rewrite functions in slope-intercept form
- Graph functions in slope intercept form by identifying the slope and y -intercept
- Graph function in standard form by finding the x - & y - intercepts
- Solve an equation for a given variable
- Identify the difference between linear and nonlinear functions
- Complete a table given a graph, equation, or description
- Construct a graph, given a table, equation, or description
- Write a description given a table, graph, or equation
- Write a function given a table, graph, or description
- Write a function given a slope and a point
- Write a function given 2 points
- Write a function given parallel and perpendicular lines and a point on the line

Interdisciplinary Standards (NJCCCS.org)

- **Standard 6.3 Active Citizenship in the 21st Century**

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- **Standard 9.1 21st-Century Life & Career Skills**

All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

- **Standard 8.2 – Technology Education**

All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world as they relate to the individual, society, and the environment.

Activities/ Technology:

- Google Classroom
- Video tutorials (Virtual Nerd)
- Function machine analogy activity
- Discrete vs. Continuous Domain comparison activity
- Venn Diagram comparing functions and relations
- Graphing activities
- Card sort functions and relations
- Scavenger hunt Functions in different forms
- Math XL

Enrichment Activities:

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Practice C - Level Worksheets
- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation:

Technology Assessment	Closure Assessments	Summative Assessments	Formative Assessments
Smart Board Lessons	Entry/ Exit Slips	Unit Quizzes	Think/Pair/Share

Calculator Labs	Thumbs Up/ Thumbs Down	Quarterly Assessments	Entry/ Exit Slips
Google Classroom Exit Slips	Dry Erase Boards	Unit Projects	Whiteboards
Online Quizzes	Think/Pair/Share	Quiz Games/ Board Games (Kahoot)	Classwork/ Homework
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			Open Ended Questions
			Verbal Assessment
			Rhetorical Questions
			Unit Projects
			Error Analysis
			Math Games
			Notebook/ Binder Quiz

Resources/ Online Resources:

- Teacher Webpage
- Google Classroom
- Math XL
- *Big Ideas Math Grade 8*, Common Core 2014 Regular Pathway
- *Mathematics Grade 8*, Holt McDougal
- Technology:
 - Khan Academy
 - Learn Zillion
 - Big Idea Math (online)
 - Purple Math

Unit #4: Systems and Inequalities

Approximate # of Weeks: 5 weeks

Essential Questions:

- Does the order in which you perform an operation matter?
- How does keeping an equation balanced aid in solving an equation?
- How do you identify and combine like terms?
- In a two-step equation, which step should you do first?
- How can you solve a system of linear equations?
- How do you solve a system algebraically?
- What types of solutions can systems of linear equations have?
- How can you apply solving systems strategies to application problems?
- How can you use an inequality to describe a real-life statement?

New Jersey Learning Standards:

- 7.EE.4
- 8.EE.8
- NCTM Mathematical Practices

Upon completion of this unit students will be able to:

- Solve multi-step equations with variables on both sides
- Solve a systems of linear equations by graphing
- Solve a system of linear equations using substitution or elimination
- Determine how many solutions a systems of equations may have
- Write, graph, and solve one-step and multi-step inequalities

Interdisciplinary Standards (NJCCCS.org)

- **Standard 9.1 21st-Century Life & Career Skills**

All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

- **Standard 9.3 - Career Awareness, Exploration, and Preparation**

All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

- **Standard 8.1 – Computer and Information Literacy**

All students will use computer applications to gather and organize information and to solve problems.

Activities/ Technology:

- Google Classroom
- Video tutorials (Virtual Nerd)
- Solving Systems with different methods venn diagram
- Solving Inequalities exploration activity
- Card Sort Solving Systems
- Scavenger Hunt solving systems
- Applications of systems guided activity
- Math XL

Enrichment Activities:

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Practice C - Level Worksheets
- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation:

Technology Assessment	Closure Assessments	Summative Assessments	Formative Assessments
Smart Board Lessons	Entry/ Exit Slips	Unit Quizzes	Think/Pair/Share
Calculator Labs	Thumbs Up/ Thumbs Down	Quarterly Assessments	Entry/ Exit Slips
Google Classroom Exit Slips	Dry Erase Boards	Unit Projects	Whiteboards
Online Quizzes	Think/Pair/Share	Quiz Games/ Board Games (Kahoot)	Classwork/ Homework
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			Open Ended Questions
			Verbal Assessment
			Rhetorical Questions
			Unit Projects

Error Analysis

Math Games

Notebook/ Binder

Quiz

Resources/ Online Resources:

- Teacher Webpage
- Google Classroom
- Math XL
- *Big Ideas Math Grade 8*, Common Core 2014 Regular Pathway
- *Mathematics Grade 8*, Holt McDougal
- Technology:
 - Khan Academy
 - Learn Zillion
 - Big Idea Math (online)
 - Purple Math

Unit #5: Patterns of Association

Approximate # of Weeks: 2 weeks

Essential Questions:

- How can you use data to predict an event?
- How can you analyze two-variable data in a table?

New Jersey Learning Standards:

- 8.SP.1-4
- NCTM Mathematical Practices

Upon completion of this unit students will be able to:

- Read and construct a scatterplot
- Sketch and write the equation for a line of best fit
- Use the line of best fit to make predictions
- Construct and interpret a two-way table

Interdisciplinary Standards (NJCCCS.org)

- **Standard 8.1 – Computer and Information Literacy**

All students will use computer applications to gather and organize information and to solve problems.

- **Standard 8.2 – Technology Education**

All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world as they relate to the individual, society, and the environment.

- **Standard 6.3 Active Citizenship in the 21st Century**

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- **Standard 5.1 Science Practices**

All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.

Activities/ Technology:

- Google Classroom
- Video tutorials (Virtual Nerd)
- Scatterplot application with class
- Trend Lines with real world examples
- Two-Way table activity real world activity
- Math XL

Enrichment Activities:

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Practice C - Level Worksheets
- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation:

Technology Assessment	Closure Assessments	Summative Assessments	Formative Assessments
Smart Board Lessons	Entry/ Exit Slips	Unit Quizzes	Think/Pair/Share

Calculator Labs	Thumbs Up/ Thumbs Down	Quarterly Assessments	Entry/ Exit Slips
Google Classroom Exit Slips	Dry Erase Boards	Unit Projects	Whiteboards
Online Quizzes	Think/Pair/Share	Quiz Games/ Board Games (Kahoot)	Classwork/ Homework
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			Math Games
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Resources/ Online Resources:

- Teacher Webpage
- Google Classroom
- Math XL
- *Big Ideas Math Grade 8*, Common Core 2014 Regular Pathway
- *Mathematics Grade 8*, Holt McDougal
- Technology:
 - Khan Academy
 - Learn Zillion
 - Big Idea Math (online)
 - Purple Math

Unit #6: Volume of Solids

Approximate # of Weeks: 3 weeks

Essential Questions:

- How do we find perimeter and area of polygons?
- How do we find the volume of a cylinder and prism?
- How can you use a net to find the surface area of 3D solids?
- How can you find the volume of a cone and pyramid?
- How do you find the volume of a sphere?

New Jersey Learning Standards:

- 7.G.5
- 8.G.9
- NCTM Mathematical Practices

Upon completion of this unit students will be able to:

- Find the surface area of three dimensional solids using a net
- Find the volume of three dimensional solids
- Find the surface area and volume of composite solids

Interdisciplinary Standards (NJCCCS.org)

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- **Standard 6.3 Active Citizenship in the 21st Century**

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Activities/ Technology:

- Google Classroom
- Video tutorials (Virtual Nerd)
- Perimeter vs. area Venn diagram
- Composite Surface Area Exploration with 3D shapes
- Surface area vs. Volume Venn Diagram

- Composite volume Exploration with 3D shapes
- Card sort volume of 3D shapes
- Scavenger Hunt Volume and Surface Area
- Math XL

Enrichment Activities:

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Practice C - Level Worksheets
- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation:

Technology Assessment	Closure Assessments	Summative Assessments	Formative Assessments
Smart Board Lessons	Entry/ Exit Slips	Unit Quizzes	Think/Pair/Share
Calculator Labs	Thumbs Up/ Thumbs Down	Quarterly Assessments	Entry/ Exit Slips
Google Classroom Exit Slips	Dry Erase Boards	Unit Projects	Whiteboards
Online Quizzes	Think/Pair/Share	Quiz Games/ Board Games (Kahoot)	Classwork/ Homework
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Resources/ Online Resources:

- Teacher Webpage
- Google Classroom
- Math XL
- *Big Ideas Math Grade 8*, Common Core 2014 Regular Pathway
- *Mathematics Grade 8*, Holt McDougal
- Technology:
 - Khan Academy
 - Learn Zillion
 - Big Idea Math (online)
 - Purple Math

Unit #7: Equations & Systems

Approximate # of Weeks: 5 weeks

Essential Questions:

- Does the order in which you perform an operation matter?
- How does keeping an equation balanced aid in solving an equation?
- How do you identify and combine like terms?
- In a two-step equation, which step should you do first?
- How can you solve a system of linear equations?
- How do you solve a system algebraically?
- What types of solutions can systems of linear equations have?
- How can you apply solving systems strategies to application problems?
- How can you determine an equation of a line when you are given the table, graph, or description?

New Jersey Learning Standards:

- 8.EE.7-8
- NCTM Mathematical Practices

Upon completion of this unit students will be able to:

- Solve multi-step equations with variables on both sides
- Solve a systems of linear equations by graphing
- Solve a system of linear equations using substitution or elimination
- Determine how many solutions a systems of equations may have
- Solve an equation for a given variable

- Write equations given a table, graph, or description
- Complete a table given a graph, equation, or description
- Construct a graph, given a table, equation, or description
- Write a description given a table, graph, or equation
- Use graphing calculator to graph linear equations and systems of linear equations

Interdisciplinary Standards (NJCCCS.org)

- **Standard 9.1 21st-Century Life & Career Skills**

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- **Standard 9.3 - Career Awareness, Exploration, and Preparation**

All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

- **Standard 8.1 – Computer and Information Literacy**

All students will use computer applications to gather and organize information and to solve problems.

Activities/ Technology:

- Google Classroom
- Video tutorials (Virtual Nerd)
- Solving Equations Balance
- Balance online activity solving equations
- Compare and Contrast Literal Equations to General Equations
- Card Sort writing equations in from different forms
- Graphing stories videos to graphs
- Solving systems card sort
- Math XL

Enrichment Activities:

- Real World Connections
- Taking Math Deeper (Big Ideas)
- Practice C - Level Worksheets
- Challenge Worksheets
- *On Core* Test Preparation Questions

Methods of Assessment/Evaluation:

Technology Assessment	Closure Assessments	Summative Assessments	Formative Assessments
Smart Board Lessons	Entry/ Exit Slips	Unit Quizzes	Think/Pair/Share
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			Math Games
			Notebook/ Binder Quiz

Resources/ Online Resources:

- Teacher Webpage
- Google Classroom
- Math XL
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- *Mathematics Grade 8*, Holt McDougal
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 - Khan Academy
 - Learn Zillion
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 - Purple Math

Appendix A: Course Sequence

Text:

- Holt McDougal Mathematics 8 Text (Green)
- Big Ideas Math Regular Pathway 8th Grade (Blue)

Marking Period 1

Summer Assignment & Review

Unit 1: Number Sense

Unit 1A

Number System Review
Irrational Numbers
Converting Between Fractions & Decimal Representations
Converting Between Repeating Decimals & Fractions
Approximating Rational Numbers
Perfect Squares & Cubes
Square Roots & Cube Roots
Approximating Square Roots
Simplifying Radical

Unit 1B

Properties of Exponents
Applications of Exponents
Understanding Scientific Notation
Operations with Scientific Notation

Unit 2: Geometry

Unit 2A

Explore the Pythagorean Theorem
Applications of the Pythagorean Theorem and its Converse (in 2 & 3 dimensions)
Midpoint/ Distance between 2 points

Marking Period 2

Unit 2B

Transformations
Translations
Reflections
Rotations
Dilations

Unit 2C

Triangle Angle Sum Theorem & Exterior Angles of Triangles
Parallel Lines cut by a Transversal

Unit 3: Functions

Unit 3A

Intro to Functions
Functions vs. Relations
Domain and Range
Discrete vs. Continuous Domain

Unit 3B

Tables, Graphs, Verbal expression, Equations
Use Similar Triangles to Compare Slopes
Slope-Intercept Form
Standard Form
Linear v. Nonlinear

Marking Period 3

Unit 3C:

Writing Functions given tables and graphs
Writing Functions given slope and a point
Writing function given 2 points
Parallel and Perpendicular Lines

Unit 4: Systems and Inequalities

Unit 4A

Solve Systems by Graphing
Solve Systems by Substitution
Solve Systems by Elimination
Special Systems
Applications of Systems

Unit 4B

Inequalities
Solving one step-inequalities
Solving Multi-step inequalities
Compound inequalities

Unit 5: Patterns of Association

Unit 5A

Scatterplots
Graphing Scatterplots

Trend Lines
Two Way Tables

Marking Period 4

Unit 6: Volume of Solids

Unit 6A

Perimeter & Circumference
Area of Circles & Polygons
Area of Irregular Figures (Composite Figures)
Surface Area of Prisms & Cylinders
Volume of Cones, Pyramids, and Spheres
Composite Volume

Unit 7: Equations & Systems

Unit 7A

Factoring
Two-Step Equations
Two-Step Equation Applications
Variables on Both sides
Literal Equations

Unit 7B

Functions, Tables, and Graphs
Graphing Stories
Write equations from tables, graphs, and descriptions
Graphing Linear Equations on a Graphing Calculator

Unit 7C

Solve systems by graphing
Solve systems by substitution
Solve systems by elimination
Applications of Systems
Solve systems with a graphing calculator