



BOE Approved 8/18

Cliffside Park Public Schools

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COURSE OF STUDY UNIT PLANNING GUIDE FOR: Grade 8 Unit 3

Grade Level:
8th

Cliffside Park School District
Cliffside Park, NJ 07010
www.cliffsidepark.edu



SUBJECT: MATHEMATICS MIDDLE SCHOOL
BOE APPROVAL: August 2018

Cliffside Park Public Schools

GRADE: 8

Course Overview:

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.

("Grade 8 » Introduction." *Grade 8» Introduction | Common Core State Standards Initiative*. Common Core State Standards Initiative, 2017. Web. 13 July 2017.)

Overview of Units:

1. Real Numbers and Linear Equations
2. Using Functions to Model Relationships and Investigating BiVariate Data
3. Systems of Linear Equations and Congruence and Similarity
4. Geometry: Pythagorean Theorem and Finding Volume and Surface Area



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Mathematics: Grade 8

Unit 2 Grade 8 Mathematics

Unit Name: Systems of Linear Equations and Congruence and Similarity (Topic 5, Topic 6)

Primary Resource: enVisionmath 2.0 Common Core 2017

Topic Name: **Topic 5:** Analyzing and Solving Systems of Linear Equations

Topic Duration: Approximately 2.5 weeks

Unit Durations: Approximately 9 weeks

TOPIC 5

Enduring Understandings:

- A system of linear equations can have no solution, one solution, or infinitely many solutions.
- The number of solutions is based on the number of intersection points of the lines in the system.
- The number of solutions can be determined by comparing the slopes and y-intercepts of the equations
- The solution to a linear system is the point or points at which the lines intersect.
- Substitution is a useful method for solving a system of linear equations. It is accomplished by rewriting an equation for one variable in terms of the other, and substituting that expression into the other equation and then solving.
- Elimination can be used to solve a system of linear equations by adding or subtracting the equation to eliminate one variable. The resulting equation can be solved for the remaining variable or used to determine if there is no solution or an infinite number of solutions.

Topic 5

Essential Question:

What does it mean to solve a system of linear equations?



What are real numbers? How are real numbers used to solve problems?

How are slopes and y-intercepts related to the number of solutions of a system of linear equations?

How does the graph of system of equations represent its solution?

When is substitution a useful method for solving a system of equations?

How are the properties of equality used to solve a system of linear equations?

Focus of Standards:

Student Outcomes: <i>What students will know.</i>	Skills <i>What students will be able to do.</i>	Assessments	Resources
<ul style="list-style-type: none"> Examine graphs of linear systems of equations to determine the number of solutions, based on number of intersection points. Compare the equations in a linear system to look for a relationship between the number of solutions and the slopes and y-intercepts of the equations. 	<ul style="list-style-type: none"> Create and examine graphs of linear systems of equations to determine the solution. Apply this understanding to solve a system of linear equations with one solution, no solutions, or infinitely many solutions. Applying this understanding to solve mathematical and real-world problems. 	<p>Formative:</p> <ul style="list-style-type: none"> Diagnostic assessment Topic Readiness Assessment <p>Summative:</p> <ul style="list-style-type: none"> Topic Assessment Topic Quiz <p>Benchmark Tests:</p> <ul style="list-style-type: none"> Benchmark test given every 6-8 weeks. 	<p>Texts:</p> <p><i>enVision 2.0 Common Core</i></p> <p>Digital:</p> <ul style="list-style-type: none"> Student/Teacher eText Videos MathXL IXL 3-Act Mathematical Modeling Virtual Nerd App BouncePages App Math Tools



<ul style="list-style-type: none"> • Understand how substitution can be used to solve linear systems of equations. • Understand how the process of elimination can be used to solve a system of linear equations with one solution, no solutions, or infinitely many solutions. 		<p>Alternative:</p> <ul style="list-style-type: none"> • Topic Performance Task • Oral questioning • Journaling • Problems worked out partially • Using manipulatives to gauge understanding and develop reasoning skills • Using questioning strategies in TE. • Creating scaffolding questions on test • Online tests • Questions tied to Real-World scenarios • Projects 	<p>Classroom Math Materials</p> <ul style="list-style-type: none"> • Student Journal • Online text • Bounceapp • Digital toolkit • Math Practices and Problem Solving Handbook
VOCABULARY			
<p>Tier 2 none</p>		<p>Tier 3 System of linear equations, solutions of a system of linear equations</p>	
NJSLS Math Standards		NJSLS Math Practices	
<p>8.EE.C.8b Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve</p>		<p>MP.1 Make sense of problems and persevere in solving them</p>	



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*

8.EE.C.8c 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.*

8.EE.C.8a 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.

8.EE.C.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.*

8SP.A.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.F.B.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.

MP.2 Reason abstractly and quantitatively.

MP.3 Construct viable arguments and critique the reasoning of others.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

MP.6 Attend to precision.

MP.7 Look for and make use of structure.

MP.8 Look for and express regularity in repeated reasoning.



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Unit Name: Systems of Linear Equations and Congruence and Similarity

Primary Resource: enVisionmath 2.0 Common Core 2017

Topic Name: **Topic 6:** Congruence and Similarity

Topic Duration: Approximately 6.5 weeks

Unit Durations: Approximately 9 weeks

TOPIC 6

Enduring Understandings:

- A translation (slide) is a transformation that moves every point of a figure the same distance and the same direction.
- A reflection (flip) creates images that have the same size and shape, but different orientation. The preimage and image are the same distance from the line of reflection but on opposite sides.
- A rotation is created by moving each point of the preimage around a fixed point. The image and preimage have the same size, shape, and orientation.
- When one transformation will not map a preimage onto its image, a sequence of transformations is needed.
- A sequence of translations, reflections, and rotations can map one figure to another without changing its size or shape.
- A dilation is a transformation that changes the size of a figure. In a dilation, the preimage and image have the same shape, angle measures, and proportions.
- Two dimensional figures are similar if there is a sequence of translations, reflections, rotations, and dilations that map one figure onto the other.
- If parallel lines are intersected by a transversal, then corresponding and alternate interior angles are congruent, and same-side interior angles are supplementary.
- The measure of an exterior angle of a triangle is equal to the sum of the measures of its remote interior angles.
- If two angles in one triangle are congruent to two other angles in another triangle, the triangles are similar triangles.



TOPIC 6

Essential Questions:

How can you show that two figures are either congruent or similar to one another?

How does a translation affect the properties of a two-dimensional figure?

How does a reflection affect the properties of a two-dimensional figure?

How does a rotation affect the properties of a two-dimensional figure?

How can you use a sequence of transformations to map a preimage to its image?

How does a sequence of translations, reflections and rotations result in a congruent figure?

What is the relationship between a preimage and its image after a dilation?

How are similar figures related by a sequence of transformations?

What are the relationships among angles that are created when a line intersects two parallel lines?

How are interior and exterior angles of a triangle related?

How can you use angle measures to determine whether two triangles are similar?



Focus of Standards:

Student Outcomes: <i>What students will know.</i>	Skills <i>What students will be able to do.</i>	Assessments	Resources
<ul style="list-style-type: none"> ● Understand translations. ● Understand and describe reflections. ● Determine how a rotation affects a two-dimensional figure. ● Understand a sequence of transformations ● Understand congruent figures using a series of transformations. ● Understand dilations. ● Understand similarity. ● Understand the relationships of angles formed by parallel lines and a transversal. ● Understand the relationships of the interior angles of a triangle. ● Determine whether triangles are similar. 	<ul style="list-style-type: none"> ● Translate a figure on a coordinate plane. ● Describe translations. ● Identify and perform a rotation. ● Refelected two-dimensional figures. ● Describe and perform a sequence of transformations. ● Identify congruent figures. ● Dilate to enlarge or reduce a figure in a coordinate plane. ● Complete a similarity transformation. ● Identify similar figures. ● Find unknown angle measures. ● Solve problems involving similar triangles 	<p>Formative:</p> <ul style="list-style-type: none"> ● Diagnostic assessment ● Topic Readiness Assessment <p>Summative:</p> <ul style="list-style-type: none"> ● Topic Assessment ● Topic Quiz <p>Benchmark Tests:</p> <ul style="list-style-type: none"> ● Benchmark test given every 6-8 weeks. <p>Alternative:</p> <ul style="list-style-type: none"> ● Topic Performance Task ● Oral questioning ● Journaling ● Problems worked out partially ● Using manipulatives to gauge understanding and develop reasoning skills ● Using questioning strategies in TE. ● Creating scaffolding questions on test ● Online tests 	<p>Texts:</p> <p><i>enVision 2.0 Common Core</i></p> <p>Digital:</p> <ul style="list-style-type: none"> ● Student/Teacher eText ● Videos ● MathXL ● IXL ● 3-Act Mathematical Modeling ● Virtual Nerd App ● BouncePages App ● Math Tools <p>Classroom Math Materials</p> <ul style="list-style-type: none"> ● Student Journal ● Online text ● Bounceapp ● Digital toolkit ● Math Practices and Problem Solving Handbook



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		<ul style="list-style-type: none"> • Questions tied to Real-World scenarios • Projects 	
VOCABULARY			
Tier 2 Transformation, translation, image, reflection, rotation, dilation, enlargement, reduction		Tier 3 Line of reflection, angle of rotation, center of rotation, congruent, scale factor, transversal, corresponding angles, alternate interior angles, same-side interior angles, remote interior angles, exterior angle of a triangle	
NJSLS Math Standards		NJSLS Math Practices	
<p>8.G.A.1a Verify experimentally the properties of rotations, reflections, and translations: Lines are transformed to lines, and line segments to line segments of the same length.</p> <p>8.G.A.1b Verify experimentally the properties of rotations, reflections, and translations: Angles are transformed to angles of the same measure.</p> <p>8.G.A.1c Verify experimentally the properties of rotations, reflections, and translations: Parallel lines are transformed to parallel lines.</p> <p>8.G.A.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates</p> <p>8.G.A.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.</p> <p>8.G.A.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</p>		<p>MP.1 Make sense of problems and persevere in solving them</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.3 Construct viable arguments and critique the reasoning of others.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p> <p>MP.8 Look for and express regularity in repeated reasoning.</p>	



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.*

Interdisciplinary Connections

NJSLS for ELA and Science are introduced, developed, and practiced in the context of learning math content and engaging in mathematical practices.

ELA

ELA-Literacy.RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks

ELA-Literacy.RST.6-8.4.Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

ELA-Literacy.RST.6-8.3 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

ELA-Literacy.SL.6.1Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

Science

MS-LS1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

MS-LS2-1 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*

MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

NJSLS: 21st Century Life and Careers

Key Subjects and 21st Century: Themes Mastery of key subjects and 21st century themes is essential to student success. Key subjects include English, reading or language arts, world languages, arts, mathematics, economics, science, geography, history, government and civics. In



addition, schools must promote an understanding of academic content at much higher levels by weaving 21st century interdisciplinary themes into key subjects:

- Global Awareness
- Financial, Economic, Business and Entrepreneurial Literacy

9.1.8.E.8 Compare the value of goods and services from different sellers when purchasing large quantities and small quantities.

9.2.8.B.5 Analyze labor market trends using state and federal labor market information and other resources available online.

9.1.8.B.7 Construct a budget to save for long-term, short-term, and charitable goals

9.1.8.C.2 Compare and contrast credit cards and debit cards and the advantages and disadvantages of using each.

9.1.8.C.5 Calculate the cost of borrowing various amounts of money using different types of credit (e.g., credit cards, installment loans, and mortgages) and compare the interest rates associated with each.

Career Ready Practices: Today's students need to develop thinking skills, content knowledge, and social and emotional competencies to navigate complex life and work environments.

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP11. Use technology to enhance productivity

NJSLS Technology Standards

8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results

8.1.8.C.1 Collaborate to develop and publish work that provides perspectives in a global problem for discussions with learners from other countries

8.1.8.F.1 Explore a local issue, by using digital tools to collect and analyze data to identify and make an informed decision.

Additional Resources:

www.ixl.com



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[Khan Academy Grade 7](#)
[Illustrative Mathematics Grade 7](#)



Integrated Differentiation/Accommodations/Modifications for Math 8 Unit 3 <i>(Alternate Modes of Instruction and Support)</i>		
Modifications to Support Gifted and Talented Students	Modifications to Support English Language Learners	Modifications to Support Our Learners (Students with IEPs/504s and At-Risk Learners)
<p>Integrate Higher Order Thinking Skills (HOTS) through questioning and extension projects specific to rational numbers, additive inverse, and properties of rational numbers.</p> <p>Provide menu of challenge activities for when the child finishes the lesson early (integrate technology when possible).</p> <p>College/Career Readiness skill enhancement - G & T students can research professions related to the Rational Numbers.</p> <p>Have the student teach the lesson - peer tutoring (research-based strategy) Accelerate pace for students who are advanced in concepts.</p> <p>Use inquiry-based, discovery learning approaches that emphasize open-ended problems with solving problems with Rational Numbers.</p> <p>Allow students to design their own ways to find the answers to complex questions.</p>	<p>Concept/Idea Map - teacher models note-taking on the modeling associated with Translations, lines cut by a transversal and similar figures.</p> <p>Contextualize language for the following key vocabulary terms: system of linear equations, solution, transformation, translation, image, reflection, rotation, dilation, enlargement, reduction, line of reflection, angle of rotation, center of rotation, congruent, scale factor, transversal, corresponding angles, alternate interior angles, same-side interior angles, remote interior angles, and exterior angle of a triangle.</p> <p>Visuals and illustrations Using a number line to add and subtract integers. Using integer tiles to represent positive and negative numbers. Using Fraction Tiles to represent adding, subtracting, multiplying and dividing fractions.</p>	<p>Review student individual educational plan and/or 504 plan for instructional, assessment, and environmental supports.</p> <p>Allow student to use calculator to simplify algebraic expressions with rational numbers.</p> <p>Teach students how to check the accuracy of the solution that was derived from use of a calculator.</p> <p>Provide manipulatives to aid in operations with rational numbers. (integer tiles and fraction tiles).</p> <p>Teach students how to check the accuracy of the solution that was derived from use of the calculator or other method.</p> <p>Provide number lines to help students with adding or subtracting integers.</p> <p>Use integer tiles to perform operations with rational numbers.</p> <p>Utilize graphic organizer or partially completed template for students to simplify expressions..</p>



	<p>Word/picture bank available for students' reference; as well as Spanish translation through Google or their textbooks.</p> <p>Wait Time Two - extend basic "Wait Time" - after the 1st student responds to a question, the teacher waits an additional 5 - 7 seconds before calling on another student to ask a question about scatter plots, correlations and lines of best fit;</p> <p>Native Language Supports: Working with peer, online assistive technology, translation device, bilingual dictionary.</p> <p>Teach the text backward - frontload the concepts and vocabulary needed for learning the material and activating prior knowledge about absolute values, properties of mathematics and integers.</p> <p>Use a word square to teach target academic vocabulary for the unit.</p>	<p>Provide study guides that are partially completed by teacher, allowing the student to fill in missing information during instruction in order to aid in obtaining information pertaining to modeling linear functions and solving linear systems.</p> <p>Utilize visual aids such as charts or graphs connected to rational numbers.</p> <p>By utilizing individual student assessment results, the teacher will provide small group or remedial instruction to review essential questions/big ideas of rational numbers, properties of numbers, operations with rational numbers, and operations with fractions.</p> <p>Provide wait time to allow students to process orally presented information and questions relating to each topic.</p> <p>Access to word/picture banks to develop an understanding and use content-specific vocabulary, such as those listed under Contextualize language.</p> <p>Allow for Student Choice: Students should be permitted to demonstrate understanding of content through illustrations, computer projects, oral response, creative presentations or demonstration, etc.</p> <p>Support comprehension of unknown vocabulary, by providing examples of Note-taking, highlighting, underlining, etc. Students should be allowed given copies of grade level material or text so they can highlight or underline pertinent information.</p>
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		<p>Text to speech/Oral reading</p> <p>Provide students with flexible seating options while working independently, depending on need or preference.</p> <p>Math-specific vocabulary and literary terms should be pre-taught before teaching relevant concepts.</p> <p>Allow extra time to complete in class written assignments.</p> <p>Provide students with a sample problem or list of steps or procedures for multi-step solutions to problems. Allow student to reference these procedures when solving independently.</p> <p>Reduce the number of assigned problems within each topic..</p> <p>Provide models or templates to teach the structure of how to solve problems systematically.</p> <p>If necessary, provide additional set of materials or online access so that students can utilize resources at school and home.</p> <p>Provide study guide for students to review before Unit 1 quizzes and tests.</p> <p>Modify tests to address big ideas/essential questions of the unit..</p>
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		<p>Provide instructional adaptations and interventions in the general education classroom.</p> <ul style="list-style-type: none">● Differentiated Intervention (enVision 2.0)<ul style="list-style-type: none">○ Reteach○ Additional Vocabulary Support○ Build Mathematical Literacy○ Math tools and Games● MATHXL● IXL <p>Intensive individual intervention:</p> <ul style="list-style-type: none">● Rtl in enVision 2.0
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Sources

New Jersey Student Learning Standards (2016) <http://www.state.nj.us/education/cccs/2016/math/standards.pdf>
New Jersey Student Learning Standards: Technology (2014) - <http://www.state.nj.us/education/cccs/2014/tech/8.pdf>
New Jersey Student Learning Standards: ELA (2014) - <https://www.state.nj.us/education/cccs/2016/ela/g03.pdf>
New Jersey Science and Engineering Practices - <https://www.state.nj.us/education/cccs/2016/science/>
NJ Career Ready Practices (2014) - <https://www.state.nj.us/education/cccs/2014/career/CareerReadyPractices.pdf>
Pearson enVision 2.0 (2016) <https://www.pearsonrealize.com/index.html#/>