



BOE Approved 8/18

Cliffside Park Public Schools

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COURSE OF STUDY UNIT PLANNING GUIDE FOR: Grade 7 Unit 1

Grade Level:
7th

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



SUBJECT: MATHEMATICS MIDDLE SCHOOL
BOE APPROVAL: August 2018

Cliffside Park Public Schools

GRADE: 7

Course Overview:

In Grade 7, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.

("Grade 7 » Introduction." *Grade 7 » Introduction | Common Core State Standards Initiative*. Common Core State Standards Initiative, 2017. Web. 13 July 2017.)

Overview of Units:

1. Operations on Rational Numbers and Expressions
2. Equations, Ratios and Proportion
3. Drawing inferences about population and probability models
4. Problem Solving with Geometry



Mathematics: Grade 7

Unit 1 Grade 7 Mathematics

Unit Name: Operations on Rational Numbers and Expressions (Topic 1, Topic 4)

Primary Resource: enVisionmath 2.0 Common Core 2016

Topic Name: Topic 1: Integers and Rational Numbers

Topic Duration: Approximately 7 weeks

Unit Durations: Approximately 11 weeks

TOPIC 1

Enduring Understandings:

- An integer and its opposite are the same distance from 0 on a number line and have a sum of 0.
- Rational numbers expressed as fractions can be written in decimal form.
- Adding integers requires adding or subtracting their absolute values and understanding the sign of the sum.
- Subtracting a number is the same as adding that number's additive inverse.
- Adding and subtracting integers is related to adding and subtracting other rational numbers.
- The sign of a product is determined by the signs of the factors in a multiplication expression.
- The same properties used to multiply integers also apply when multiplying rational numbers.
- The relationship between multiplication and division can be useful when dividing positive and negative integers.
- Dividing rational numbers is similar to dividing integers. The sign of the quotient depends on the signs of the dividend and divisor.
- Problems involving rational numbers can be solved by making sense of the quantities and their relationship to each other.



TOPIC 1

Essential Questions:

How are integers and their opposites related?

How are rational numbers written as decimals?

How do you use what you know about absolute value to add integers?

How is subtracting integers related to adding integers?

How are adding and subtracting integers related to adding and subtracting other rational numbers?

How do the signs of factors affect their product?

How is multiplying rational numbers like multiplying integers?

How does dividing integers relate to multiplying integers?

How is dividing rational numbers like dividing integer?

How do you decide which rational number to use to solve problems?

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 how integers and their opposites are related. ● Understand how to divide integers by 	<ul style="list-style-type: none"> ● Identify rational numbers and write them in decimal form. ● Add positive and negative integers. 	Formative: <ul style="list-style-type: none"> ● Diagnostic assessment ● Topic Readiness Assessment 	Texts: <i>enVision 2.0 Common Core</i> Digital: <ul style="list-style-type: none"> ● Student/Teacher eText



<p>applying the rules of multiplying integers.</p> <ul style="list-style-type: none"> • Determine equivalences among integer quotients. • Understand how the signs of integers in a multiplication sentence relate to the signs in a related division statement. • Decide which operation to use to solve problems. 	<ul style="list-style-type: none"> • Model integer addition in real-life applications. • Use properties of operations to add and subtract numbers. • Multiply positive and negative integers. • Apply integer multiplication to real-life applications. • Find the product of rational numbers. • Use precision when solving problems with rational numbers. • Use mathematical modeling to represent a problem situation and to propose a solution. • Test and verify the appropriateness of their math models. 	<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 • Questions tied to Real-World scenarios • Projects 	<ul style="list-style-type: none"> • 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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VOCABULARY	
Tier 2 none	Tier 3 Repeating decimal, terminating decimal, complex fraction, multiplicative inverse
NJSLS Math Standards	NJSLS Math Practices
<p>7.NS.A.1a Describe situations in which opposite quantities combine to make 0. <i>For example, in the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the second round?</i></p> <p>7.NS.A.2d Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.</p> <p>7.NS.A.1b Understand $p + q$ as the number located a distance q from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.</p> <p>7.NS.A.1d Apply properties of operations as strategies to add and subtract rational numbers.</p> <p>7.NS.A.1c Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.</p> <p>7.NS.A.2a Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.</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>



7.NS.A.2c Apply properties of operations as strategies to multiply and divide rational numbers.

7.NS.A.2b Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, New Jersey Student Learning Standards for Mathematics 50 then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real world contexts.

7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.¹

¹ Computations with rational numbers extend the rules for manipulating fractions to complex fractions.

7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

Additional Resources:

www.ixl.com

[Khan Academy Grade 7](#)

[Illustrative Mathematics Grade 7](#)

Unit Name: Operations on Rational Numbers and Expressions

Primary Resource: enVisionmath 2.0 Common Core 2016



Topic Name: **Topic 4:** Generate Equivalent Expressions

Topic Duration: Approximately 4 weeks

Unit Durations: Approximately 11 weeks

TOPIC 4

Enduring Understandings:

- Algebraic expressions can be used to represent and solve problems in real-world contents.
- Rearranging or combining like terms does not change the value of an expression.
- All like terms must be combined in order for expressions to be simplified.
- Expanded expressions represent an equivalent way to represent the original expression.
- The Distributive Property and common factors are used to factor expressions.
- Use mathematical modeling to represent a problem situation and to propose a solution.
- Test and verify the appropriateness of their math models.
- Explain why the results from their mathematical models may not align exactly to the problem solution.
- Use properties of operations to subtract expressions.
- Model addition of expressions in real-life applications.
- Use properties of operations to subtract expressions.'
- Model subtraction of expressions in real-life applications
- Write equivalent expressions to show how quantities are related in real-life.

TOPIC 4

Essential Questions:

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 how variables are used to represent unknown values in a problem. ● Recognize when two expressions are equivalent. ● Understand expanding an expression is the reverse of factoring. 	<ul style="list-style-type: none"> ● Use properties of operations to write equivalent expressions. ● Combine like integers and rational terms. ● Use the Distributive Property to expand expressions. ● Identify the GCF of algebraic terms in expressions. ● Use mathematical modeling to represent a problem situation and to propose a solution. ● Test and verify the appropriateness of their math models. ● Explain why the results from their model may not align exactly to the problem situation. ● Use properties of operations to add expressions. ● Model subtraction of expressions in real-life applications. 	<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. 	<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



	<ul style="list-style-type: none"> • Write equivalent expressions to show how quantities are related in real-life applications. 	<ul style="list-style-type: none"> • Creating scaffolding questions on test • Online tests • Questions tied to Real-World scenarios • Projects 	
VOCABULARY			
Tier 2 none		Tier 3 none	
NJSLS Math Standards		NJSLS Math Practices	
<p>7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. <i>For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.</i></p> <p>7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and</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>	



inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*

7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients

7.EE.A.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, $a + 0.05a = 1.05a$ means that “increase by 5%” is the same as “multiply by 1.05.”*

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.6.1 Engage 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-ESS3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ESS-3.1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

MS.ESS.3.4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

MS-ETS1-4 Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

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:

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[Khan Academy Grade 7](#)

[Illustrative Mathematics Grade 7](#)



Integrated Differentiation/Accommodations/Modifications for Math 7 Unit 1 <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 additive inverse operations, properties of numbers, relate integers, solve problems with rational numbers and their opposites.</p> <p>Contextualize language for the following key vocabulary terms: absolute value, integers, rational number, complex fractions, associative property, distributive property, multiplicative inverse, repeating decimals, and terminating decimals.</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>Word/picture bank available for students' reference; as well as Spanish translation through Google or their textbooks.</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>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 the Unit 1.</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 Unit 1.</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 Unit 1.</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#/>