Unit 2 Equations and Inequalities

Content Area: **Mathematics**
Course(s): **Mathematics 6**
Time Period: **November**
Length: **63 Instructional days**
Status: **Published**

Unit Overview

Unit Two includes equations and inequalities encompassing sixty-three days. The main focus is evaluating ratios and proportional relationships, understanding the number system, and evaluating expressions and equations. Mathematical Practices from the box below will be connected to the daily lessons.

UNIT 2	Content Focus	Math Practices
28 days	Ratios with Tables, Comparing, and Graphing, Rates, Percents, and Converting Measurements	1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others 4. Model with Mathematics 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning
17 days	Understanding Algebraic Expressions with Properties	1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others 4. Model with Mathematics 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning
18 days	Writing and Solving Equations with all Operations in One and Two Variables, Writing, Graphing, and Solving Inequalities with all Operations	1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others 4. Model with Mathematics 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure

		8. Look for and express regularity in repeated reasoning

Priority Standards

MA.6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
MA.6.RP.A.2	Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.
MA.6.RP.A.3d	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
MA.6.NS.C.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
MA.6.NS.C.6	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
MA.6.NS.C.7	Understand ordering and absolute value of rational numbers.
MA.6.NS.C.8	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
MA.6.EE.B.5	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
MA.6.EE.B.7	Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.
MA.6.EE.B.8	Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real- world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
MA.6.EE.C.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

Unit Assessments

- Big Ideas Chapter 5 Assessment with Standards
- Big Ideas Chapter 6 Assessment with Standards
- Big Ideas Chapter 7 Assessment with Standards
- Big Ideas Quix 6.1-6.3
- Big Ideas Quiz 5.1-5.4
- Big Ideas Quiz 5.5-5.7
- Big Ideas Quiz 6.4-6.5
- Big Ideas Quiz 7.1-7.4
- Big Ideas Quiz 7.5-7.7
- S/W Grade 6 Math Benchmark Unit 2

Student Learning Goals (Objectives)

Content Focus	**CCCS** **Priority Standard**	**Learning Goals**	**Learning Targets**
Understand ratios, ratio tables, rates, and unit rates. Understand fraction and percent comparisons.	MA.6.6.RP.1 MA.6.6.RP.2 MA.6.6.RP.3	Solve real world and mathematical problems using ratios and unit rates (6.RP.3)	I can perform basic processes, such as • use ratio language to describe a ratio relationship between two quantities (6.RP.1) • Use rate language in the context of a ratio relationpship (6.RP.2) • Recognize multiple equivalent representations of ratios
Apply and extend previous understandings of arithmetic to algebraic expressions	6.EE.1 6.EE.2 6.EE.3 6.EE.4	Evaluate expression at specific values of their variables including whole-number exponents (6.EE.1; 6.EE.2c) Generate equivalent	I can perform basic process, such as

		expressions using the properties of operations (6.EE.3)	
Apply and extend previous understandings of arithmetic to algebraic expressions to solve equations and inequalities	MA.6.6.EE.5 MA.6.6.EE.7 MA.6.6.EE.8 MA.6.6.EE.9	Solve real world and mathematical equations of the form x + p = q when all variables are nonnegative, rational numbers (6.EE.7) Write an inequality of the form x > c or x < c to represent a constraint of condition of a real-world or mathematical problem (6.EE.8) Analyze the relationship between the independent and dependent variables using graphs, tables, and equations (6.EE.9)	I can perform basic processes, such as • Use substitution to determine whether a given number makes an equation or inequality (6.EE.5) • Use variables to represent numbers and write expressions (6.EE.6) • Represent solutions of inequalities on number line diagrams (6.EE.8) • Write an equation to express one quantity (dependent variable) in terms of the other quantity (independent variable (6.EE.9)

- SWABT write an inequality of the form x > c or x < c to represent a constraint of condition of a real world or mathematical problem (6.EE.8)
- SWBAT analyze the relationship between the independent and dependent variable using graphs, tables, and equations (6.EE.9)
- SWBAT solve real world and mathematical equations of the form x + p = q when all variables are non negative, rational numbers (6.EE.7)
- SWBAT solve real world and mathematical problems using ratios and unit rates (6.RP.3)

Unit Learning Targets

- I can • demonstrate how ratios compare two quantities: the quantities do not have to be the same unit of measure.
- I can • explain how order matters when writing a ratio.
- I can analyze context to determine which kind of ratio is represented.
- I can analyze the relationship between a ratio a:b and a unit rate a/b where is not equal to 0.
- I can analyze the relationship between the dependent variable and independent variable using tables and graphs.
- I can calculate absolute value.
- I can calculate the distance between two points with the same first coordinate or same second coordinate.
- I can define an inverse operation.
- I can define independent and dependent variables.
- I can demonstrate how ratios can be simplified.
- I can develop a rule for solving one step equations.
- I can distinguish comparisons of absolute value from statements about order and apply to real world contexts.
- I can explain where zero fits into a situation represented by integers.
- I can find a position pairs of integers and other rational numbers on a coordinate plane.
- I can find and position integers and other rational numbers on a horizontal or vertical number line diagram.
- I can find the missing values in a table of equivalent ratios.
- I can generalize that all ratios relate two quantities or measures within a given situation in a multiplication relationship.
- I can graph points in all four quadrants of the coordinate plane.
- I can identify an integer and its opposite.
- I can identify and calculate a unit rate.
- I can make a table of equivalent ratios using whole numbers.
- I can recognize solving an equation or inequality as a process of answering which values from a specific set, if any, make the equation or inequality true.
- I can recognize that ratios appear in a variety of different contexts: part-to-whole, part-to-part, and rates.
- I can represent solutions to inequalities on a number line.
- I can solve and write equations for real world situations.
- I can solve real-world problems by graphing points in all four quadrants.
- I can solve real-world problems involving rate and ratio.
- I can use appropriate math terminology as related to rate.
- I can use integers to represent quantities in real world situations.
- I can use inverse operations to solve one step variable equations.
- I can use substitution to determine whether a given number in a specified set makes an equation or inequality true.
- I can use the solution to an equation or inequality to prove that the answer is correct.

- I can use variables to represent two quantities in a real world problem.
- I can write an inequality to represent a condition.
- I can write ratio notation.

Learning Plan (Skills and Activities)

Unit 2	Topic	Activity	Learning Goals	Learning Targets	Resource
Weeks 12-16	Ratios with Tables, Comparing, and Graphing, Rates, Percents, and Converting Measurements	**Whole Group**: Ch. 5 /Lessons 1-7 (from Big Ideas Teachers Manual) Chapter Opener, Start Thinking! Warm-Up Introduce Vocabulary Words. Laurie's notes. Activity Journal with partners. Teachers can decide which pages will be done in groups and which pages will be done during independent work.) **Small Group**: Journal activities. Lesson problems from text or on-line digital book. Lesson tutorials from dynamic classroom. Differentiated lessons from dynamic classroom. Skills review handbook. **Independent Work:** Resources by the Chapter – Practice A and B	SWBAT understand the concept of a ratio SWBAT use ratios to describe the relationship between two quantities SWBAT use ratio tables to find equivalent ratios SWBAT solve real-life problems SWBAT understand the concepts of rates and unit rates SWBAT write unit rates SWBAT compare ratios SWBAT compare unit rates SWBAT graph ordered pairs to compare ratios and rates SWBAT write percents as fractions SWBAT write fractions as percents SWBAT find	I can: • write ratio notation. • explain how order matters when writing a ratio. • demonstrate how ratios can be simplified. • demonstrate how ratios compare two quantities: the quantities do not have to be the same unit of measure. • recognize that ratios appear in a variety of different contexts: part-to-whole, part-to-part, and rates. • generalize that all ratios relate two quantities or measures within a given situation in a multiplication relationship. • analyze context to determine which kind of ratio is represented. • identify and calculate a unit rate. • use appropriate math	Big Idea NJ DOE Curriculu National Virtual Manipul Accelera Corestan NJCTL Chromeb

		Puzzle Time Student Text problems Enrichment and Extension Technology Connection	percents of numbers SWBAT find the whole given the part and the percent SWBAT use conversion factors	terminology as related to rate. • analyze the relationship between a ratio a:b and a unit rate a/b where b is not equal to 0. • make a table of equivalent ratios using whole numbers. • find the missing values in a table of equivalent ratios. • solve real-world problems involving rate and ratio.	
Weeks 16-18	Understanding Algebraic Expressions with Properties	**Whole Group**: Ch. 5 /Lessons 1-6 (from Big Ideas Teachers Manual) Chapter Opener, Start Thinking! Warm-Up Introduce Vocabulary Words. Laurie's notes. Activity Journal with partners. Teachers can decide which pages will be done in groups and which pages will be done during independent work.) **Small Group**: Journal activities. Lesson problems from text or on-line digital book. Lesson tutorials from dynamic classroom.	SWBAT use the Distributive Property to multiply a fraction and a mixed number. This is generalized to multiply mixed numbers • SWBAT understand simple word problems, and then write and evaluate a mathematical expression that corresponds to the given situations • SWBAT explain how to evaluate an algebraic expression containing a variable • SWBAT write algebraic expressions to represent phrases	I can: •use numbers and variables to evaluate expressions. • translate written phrases into algebraic expressions. •translate algebraic expressions into written phrases. • create equivalent expressions using the properties of operations. •apply properties of operations to create equivalent expressions. • recognize when two expressions are equivalent. • prove that two expressions are equivalent no matter what number is	Big Idea National Virtual Manipul Accelera Corestan NJCTL Chromeb

		Differentiated lessons from dynamic classroom. Skills review handbook. **Independent Work**: Resources by the Chapter – Practice A and B Puzzle Time Student Text problems Enrichment and Extension Technology Connection	that include words corresponding to the operations of addition, subtraction, multiplication, and division • SWBAT write an algebraic expression that represents a verbal phrase • SWBAT gain an understanding of what is meant by order and grouping as they apply to number operations • SWBAT use the Commutative and Associative Properties, and two other properties, to show that expressions are equivalent • SWBAT gain an understanding of how the Distributive Property can be used to perform multiplication problems using mental math • SWBAT use the Distributive Property to show that two expressions are equivalent	substituted. • recognize that a variable can represent an unknown number, or, depending on the scenario/situation, any number in a specific set. •relate variables to a context. • write expressions when solving a real-world or mathematical problem.	
Weeks 19-21	Writing and Solving Equations with all Operations in One and Two Variables, Writing, Graphing,	**Whole Group**: Ch.7 /Lessons 1-7 (from Big Ideas Teachers Manual) Chapter Opener, Start	• SWBAT write word sentences as equations SWBAT use	I can: • recognize solving an equation or	Big Idea NJ DOE Curricul

	and Solving Inequalities with all Operations	Thinking! Warm-Up Introduce Vocabulary Words. Laurie's notes. Activity Journal with partners. Teachers can decide which pages will be done in groups and which pages will be done during independent work.) **Small Group:** Journal activities. Lesson problems from text or on-line digital book. Lesson tutorials from dynamic classroom. Differentiated lessons from dynamic classroom. Skills review handbook. **Independent Work:** Resources by the Chapter – Practice A and B Puzzle Time Student Text problems Enrichment and Extension Technology Connection	addition or subtraction to solve equations SWBAT use multiplication or division to solve equations SWBAT identify independent and dependent variables SWBAT write equations in two variables SWBAT use tables and graphs to analyze the relationship SWBAT write word sentences as inequalities SWBAT use all operations to solve inequalities	inequality as a process of answering which values from a specific set, if any, make the equation or inequality true. • use the solution to an equation or inequality to prove that the answer is correct. • use substitution to determine whether a given number in a specified set makes an equation or inequality true. • define an inverse operation. • use inverse operations to solve one step variable equations. • develop a rule for solving one step equations. • solve and write equations for real orld situations. • write an inequality to represetn a condition. • represetn solutions to inequalitites on a number line. • define independent and dependent variables. • use variables to represent two quantities in a real world	National Virtual Manipul Accelera Corestan NJCTL Chromeb

				problem. • analyze the relationship between the dependent variable and independent variable using tables and graphs.	

Materials and Resources

- Big Ideas - Big Ideas Learning LLC. 2014 www.bigideasmath.com
- Brightlinks Projector
- Chromebooks
- Document Camera
- http://www.njctl.org/courses/math/
- National Library of Virtual Manipulatives http://nlvm.usu.edu/en/nav/vlibrary.html
- NJ DOE Model Curriculum www.state.nj.us/education/modelcurriculum
- Soundfield System
- White Boards
- www.corestandards.org

Technology Integration

- 8.1.8.A.1 Demonstrate knowledge of a real world problem using digital tools
- 8.2.8.A.2 Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
- Create instructional videos using Animote app
- Create screenshots to record explanations of problems

TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.A.2	Create a document (e.g., newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
TECH.8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

TECH.8.1.8.A.4	Graph and calculate data within a spreadsheet and present a summary of the results.
TECH.8.1.8.A.5	Create a database query, sort and create a report and describe the process, and explain the report results.

21st Century Life and Career Ready Practices

- CRP3. Attend to personal health and financial well-being.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

Strategies for Differentiating Instruction

- Extend pacing of lessons
- Graph paper
- Incorporate centers that focus on skills that students are struggling with
- Modified/shortened assignments if necessary
- Multiplication chart
- Place value chart if applicable
- Provide a copy of written notes/directions
- Provide list/chart of key words used in word problems to help determine operation. For example "In all, altogether mean addition"
- Provie list of formulas/conversions if applicable
- Small group instruction based on levels/abilities
- Use of calculator
- Use of manipulatives
- Utilize visual aids

Marzano Elements

- Communicating high expectations for each student to close the achievement gap (DQ9)
- Establishing and maintaining effective relationships in a student centered classroom (DQ8)
- Helping students engage in cognitively complex tasks (DQ4)
- Helping students examine similarities and differences (DQ3)
- Helping students examine their reasoning (DQ3)
- Helping students practice skills, strategies, and processes (DQ3)
- Helping students process new content (DQ2)
- Helping students revise knowlege (DQ3)
- Identifying critical content from the standards (DQ2)
- Organizing students to interact with content (DQ2)
- Organizing students to practice and deepen knowledge (DQ3)
- Previewing New Content (DQ2)

- providing feedback and celebrating success (DQ1)
- Reviewing Content (DQ3)
- Using engagement strategies (DQ3)
- Using formative assessments to track student progress (DQ1)
- Using questions to help students elaborate on content (DQ2)