Unit 5 - Expressions, Equations, Functions, and Inequalities

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 17**
Length: **10 Weeks**
Status: **Published**

Unit Overview

Students will begin this unit learning about powers and exponents and how they are used in order of operations. These topics are vital to simplifying numerical expressions and evaluating algebraic expressions. Then, students will learn the properties of algebra, which they will use to write and simplify algebraic expressions. These prerequisite skills provided in the expressions chapter will allow the students to solve and write one-step addition, subtraction, multiplication, and division equations. As an extension to learning how to write, solve, and evaluate equations, students will explore the uses of input and output tables and develop function rules when looking at patterns in function tables. They will also learn how to write, solve, and graph inequalities, which have similar rules to equations.

Standards

CCSS.Math.Content.6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
CCSS.Math.Content.6.NS.B.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
CCSS.Math.Content.6.NS.B.4	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.
CCSS.Math.Content.6.EE.A	Apply and extend previous understandings of arithmetic to algebraic expressions.
CCSS.Math.Content.6.EE.A.1	Write and evaluate numerical expressions involving whole-number exponents.
CCSS.Math.Content.6.EE.A.2	Write, read, and evaluate expressions in which letters stand for numbers.
CCSS.Math.Content.6.EE.A.2.a	Write expressions that record operations with numbers and with letters standing for numbers.
CCSS.Math.Content.6.EE.A.2.b	Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.
CCSS.Math.Content.6.EE.A.2.c	Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
CCSS.Math.Content.6.EE.A.3	Apply the properties of operations to generate equivalent expressions.
CCSS.Math.Content.6.EE.A.4	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).
CCSS.Math.Content.6.EE.B	Reason about and solve one-variable equations and inequalities.

CCSS.Math.Content.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.
CCSS.Math.Content.6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
CCSS.Math.Content.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.
CCSS.Math.Content.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.
CCSS.Math.Content.6.EE.C	Represent and analyze quantitative relationships between dependent and independent variables.
CCSS.Math.Content.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.

Essential Questions

- How does simplifying an expression help us in solving equations?
- How do we use algebraic properties when simplifying expressions and solving equations?
- How does order of operations play a part in simplifying expressions and solving equations?
- Why must we do the same operation to both sides of the equation?
- Why is it important to understand algebraic equations?
- How can we write equations to represent real-life situations?
- How do we use function tables in the real world?
- How do function tables help us come up with a rule?
- How are inequalities and equations related?

Application of Knowledge: Students will know that...

- a coefficient is the numerical factor of a term that contains a variable.
- a constant is a term without a variable.
- a function is a relation that assigns exactly one output value to one input value
- algebra is a language of symbols including variables, which are symbols used to represent numbers.
- algebraic expressions can be evaluated as numerical expressions when given values for the variables in the expression.
- algebraic expressions contain at least one variable and at least one operation.
- an exponent tells how many times a base is used as a factor.
- an inequality is a mathematical sentence that compares quantities.

- an inverse operation is an operation that undoes another operation.
- like terms are terms that contain the same variables and can be combined.
- numerical expressions are simplified using the order of operations.
- terms are parts in an algebraic expression that are separated by addition or subtraction.
- when solving equations, the same operation must be done to both sides in order to keep the equation balanced and true.

Application of Skills: Students will be able to...

- evaluate an algebraic expression.
- finding the rule for a function table.
- simplify a numerical expression.
- simplify an algebraic expression by combining like terms.
- solving one-step equations.
- using an input-output table.
- writing equations.
- writing expressions.
- writing, solving, and graphing inequalities.

Assessments

- Do Now: These daily assessments will include a few questions to check for prior knowledge and to determine mastery of particular topics. Remediation can also be done through this activity on an as needed basis.
- Exit Tickets and Quick Checks: These will be used to measure student understanding of the lesson and assist in determining whether remediation is needed for the topic or if there were any common misconceptions amongst the students.
- Communicator Practice: During guided practice, this will be used as a quick whole-class assessment tool to check for complete comprehension.
- IXL Practice: This online tool will be used to formatively assess students during independent practice. This will provide students with practice and immediate self-check.
- Homework and Classwork: These will be used to formatively assess students. Some examples of activities that can be used in class as assessments are listed in suggested activities (Simplifying Expressions SCOOT, Algebraic Expressions Match Up, One-Step Equation Maze, Write and Solve Equations Scavenger Hunt, Graphing Inequalities Puzzle Activity, and Functions and Function Tables Task Cards)
- Marzano learning goals self-assessment: Students will complete tiered questions to determine their own proficiency in the topic on a scale of 0 to 4
- Informal Observations: Walking around the room, listening to productive conversations, and checking in on students will help to formatively assess their learning.
- Mid-Chapter Quiz: This will be used to formatively assess students halfway through the chapter.
- Chapter Test: This will be used to summatively assess students at the end of the chapter.
- Information from this unit will be included on a locally developed, mid-year or end of year benchmark assessment that may take the form of a test, performance based project, or other summative assessment.

Suggested Activities

- Grade 6 Digits Topic 1, 2, 3, and 4 Launches
- Inquiry labs using algebra tiles
- Student centered Smart Board lessons using interactive algebra tiles that students can drag and drop
- Review games using communicators
- Marzano learning goals self-assessment: Students will complete tiered questions to determine their own proficiency in the topic on a scale of 0 to 4
- Power and Exponents I Have Who Has - Students will each be given a card with an answer to someone else's question and a new question that they must ask the class. Students will identify themselves when they have the answer to the question asked.
- Understanding Variables - Students will be given different terms including constants, different variables, and even variables with exponents. They will be asked to sort themselves into groups of like terms. As a class, we will then have a discussion about why they sorted themselves in the way that they did and how we can use these groupings to simplify expressions
- Simplifying Expressions SCOOT - There will be a task card taped to each desk and students will walk around the tables to simplify the expression on each card
- Algebraic Expressions Match Up - Students will match up algebraic expressions to the correct situation described in words
- Equation Balance - Students will use an actual balance and a SMARTboard interactive balance to see how to isolate a variable in order to solve for the value of that variable
- One-Step Equation Maze - Students will solve one-step equations to follow the correct path to the finish line
- Write and Solve Equations Scavenger Hunt - Students will walk around the room and write and solve equations to the word problem at hand. They will find their answers on another card around the room, which will help them self-check
- Graphing Inequalities Puzzle Activity - Students have to match up inequalities with their respective graphs
- Functions and Function Tables Task Cards - Students will work in groups to complete Tasks involving functions and function tables
- Expressions Birthday Budget - Students will explore Google Sheets to create functions in order to make a Birthday Budget sheet

Activities to Differentiate Instruction

Differentiation for special education:

- General modifications may include:
    - Modifications & accommodations as listed in the student's IEP
    - Assign a peer to help keep student on task
    - Modified or reduced assignments
    - Reduce length of assignment for different mode of delivery
    - Increase one-to-one time
    - Working contract between you and student at risk

    - Prioritize tasks
    - Think in concrete terms and provide hands-on-tasks
    - Position student near helping peer or have quick access to teacher
    - Anticipate where needs will be
    - Break tests down in smaller increments
- Content specific modifications may include:
    - Use algebra tiles to provide more hands on and visual representation of variables and expressions
    - Use a balance to show how equations are solved
    - Use patterns that are easily discernible in function tables
    - Provide numbered lines for graphing inequalities
    - Provide guided notes and step-by-step instructions on solving equations
    - Provide worked out examples on classwork and homework that students can use as a guide when working independently

Differentiation for ELL's:

- General modifications may include:
    - Strategy groups
    - Teacher conferences
    - Graphic organizers
    - Modification plan
    - Collaboration with ELL Teacher
- Content specific vocabulary important for ELL students to understand include:
    - Numerical expression, variable, algebraic expression, exponent, term, coefficient, constant, like terms, associate property, commutative property, identity property, distributive property, simplify, evaluate, inverse operation, solution, function, sequence, inequality

Differentiation to extend learning for gifted students may include:

- Simplifying numerical expressions with more than 4 operations involved
- Simplifying algebraic expressions with multiple terms and variables
- Evaluating algebraic expressions with more than one variable
- Writing algebraic expressions with more than one operation
- Writing and solving two step equations
- Finding function rules that are two step
- Writing, solving, and graphing two step inequalities

Integrated/Cross-Disciplinary Instruction

- **ELA:** Translating sentences and word problems into algebraic expressions and then solving them
- **Science:** Using an equation to convert Fahrenheit to Celsius or vice versa
- **Technology:** Using functions in Microsoft Excel and Google Sheets
- **Economics:** Using functions and equations to represent trends

Resources

- Digits student access and support: www.MyMathUniverse.com
- Digits teacher materials and support: www.pearsonrealize.com
- IXL: www.ixl.com
- SMART Exchange: www.exchange.smartteach.com
- SMART Board Lessons
- Pizzazz worksheets (self-correcting)
- Kuta software generated worksheets
- Khanacademy: www.khanacademy.org
- Buzzmath: www.buzzmath.com
- NCTM Illuminations: www.illuminations.nctm.org
- New Jersey Center for Teaching and Learning: www.njctl.org

21st Century Skills

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.