

Unit # 2: Equations, Inequalities, and Applications

Content Area: **Mathematics**
Course(s): **College Prep Math 2**
Time Period: **February**
Length: **12 days**
Status: **Published**

Unit Overview

Algebraic methods of solving multi - step equations are developed using the properties of equality in this unit. In the same way, solving multi - step inequalities will be reviewed and reinforced. Steps for solving various types of word problems involving both equations and inequalities will be covered and practiced throughout this unit. Additionally, ratio, proportion, and percent , along with applications will be addressed.

Enduring Understandings

- Ratio, proportion, and percent are concepts that have many everyday life applications
- Rules of arithmetic and algebra can be used together with (the concept of) equivalence to transform equations and inequalities so solutions can be found to solve problems.

Essential Questions

- How can you use proportion and percent to solve real-life applications ?
- How are proportion and percent problems solved ?
- What are the best methods to accurately solve an equation ?
- What are the best methods to accurately solve an inequality ?
- Why is it useful to represent real-life situations algebraically?

Standards / Indicators / Student Learning Objectives (SLOs) :

- SWBAT graph intervals on a number line (inequalities)
- SWBAT interpret a word phrase into a ratio
- SWBAT solve application problems using proportions.
- SWBAT solve inequalities using both properties of inequality.
- SWBAT solve linear inequalities with three parts.
- SWBAT solve proportions.
- SWBAT solve word problems involving unknown numbers and sums of quantities.
- SWBAT use inequalities to solve application problems.
- SWBAT use ratio and proportion to solve the 3 basic types of percent problems.
- SWBAT use the addition and multiplication properties of inequality.
- SWBAT write expressions for two related unknown quantities..

- SWBAT identify linear equations.
- SWBAT solve equations that have no solution or infinitely many solutions.
- SWBAT solve equations with fractions and decimals as coefficients.
- SWBAT use the addition and multiplication properties of equality to solve equations.

MA.K-12.1

Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

MA.K-12.3

Construct viable arguments and critique the reasoning of others.

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

MA.8.EE.C.7

Solve linear equations in one variable.

MA.8.EE.C.7b

Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

MA.7.EE.B.4b

Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

For example: As a salesperson, you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write an inequality for the number of sales you need to make, and describe the solutions.

MA.6.EE.B

Reason about and solve one-variable equations and inequalities.

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.

Lesson Titles

- An Introduction to Applications of Linear Equations
- More on Solving Linear Equations
- Ratio, Proportion, and Percent
- Solving Linear Inequalities
- The Addition Property of Equality
- The Subtraction Property of Equality

Career Readiness, Life Literacies & Key Skills

WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.

Inter-Disciplinary Connections

LA.RH.11-12.4	Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines faction in Federalist No. 10).
LA.WHST.11-12.2.E	Provide a concluding paragraph or section that supports the argument presented.
SCI.HS-PS4-1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

Instructional Strategies, Learning Activities, and Blooms/DOK:

- Review, examples, and practice solving addition and subtraction equations.
- Review, examples, and practice solving applications of linear equations
- Review, examples, and practice solving linear inequalities
- Review, examples, and practice solving multiplication and division equations
- Review, examples, and practice solving multi-step linear equations
- Review, examples, and practice solving ratio, proportion, and percent problems.
- Tutoring during Delsea One

Modifications

ELL Modifications

- 1:1 testing
- Alternate assessment options....physical demonstration
- Repeat, reword, clarify
- Tap prior knowledge

IEP and 504 Modifications

- Modeling and showing lots of examples
- Allowing co-teaching with general education and special education teachers in the same classroom so that the special education teacher can re-teach students with special needs in a different way in a smaller group (pulled to the side)
- Allowing student to take notes in class for reinforcement but also providing a copy of completed/correct notes to study from
- If not in a co-teaching setting allowing time in the schedule for a special education teacher to consult with general education teachers on what specifically can be modified or how to paraphrase things in a different way specific to that lesson

G & T Modifications

- Different test items.
- Generating and testing hypotheses
- Specific career they are interested in? How would this apply to their interest?)
- Specific career they are interested in? How would this apply to their interest?) 2.)Additional reinforcement activities soliciting a deeper understanding of curriculum.

Formative Assessment

- Accuplacer practice problem
- Begin the homework assignment and periodically check answers together
- Class discussions
- Graded classwork
- Graded homework
- Guided practice
- Individual practice
- Oral questioning
- Oral response

- Teacher observation
- Warm up problems - solving linear inequalities in 3 parts
- Warm up problems - finding percentages and percents
- Warm up problems - graphing intervals on a number line
- Warm up problems - identifying linear equations
- Warm up problems - solving applications using proportions
- Warm up problems - solving equations that have no solution or infinitely many solutions
- Warm up problems - solving equations with fractions or decimals as coefficients
- Warm up problems - solving inequalities using both the addition and multiplication properties of inequalities
- Warm up problems - solving problems involving consecutive integers
- Warm up problems - solving problems involving supplementary and complementary angles
- Warm up problems - solving problems involving unknown numbers and sums of quantities
- Warm up problems - solving proportions
- Warm up problems - using inequalities to solve applications
- Warm up problems - using the addition and multiplication properties of inequalities
- Warm up problems - using the addition property of equality to solve one step equations
- Warm up problems - using the multiplication property of equality to solve one step equations
- Warm up problems - writing expressions for 2 related unknown quantities
- Warm up problems - writing ratios
- Written work

Summative Assessment

- Accuplacer Practice Test
- Accuplacer Test
- Quiz on solving linear equations - (sections 2.1 - 2.4)
- Unit Test on Equations, Inequalities, and Applications

Resources & Materials

- Computer Generated Warm Ups (see formative assessment section for specific topics)
- Internet worksheets (see formative assessment section for specific topics)
- Teacher made worksheets (see formative assessment section for specific topics)
- Text: Introductory Algebra (2010) (Ninth Edition)
- Warm up problems (see formative assessment section)

Technology

- Internet Sources: <http://accuplacer.collegeboard.org/students>
- Chrome book
- Math XL
- Smart Board

TECH.8.1.12.C

Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

TECH.8.1.12.D.CS2

Demonstrate personal responsibility for lifelong learning.