Unit 2: Solving Linear Equations

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 5**
Length: **5 Weeks**
Status: **Published**

Unit Overview

In this unit on quantities and reasoning with equations, students will use properties of equality and the distributive property to solve one, two, and multi-step linear equations in one variable. These will include equations with variables on both sides and equations with no real solutions or infinite solutions. They will write and solve proportions and apply them to percent problems and problems with similar figures. Students will finish the unit by rewriting equations and formulas.

Standards

MA.A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
MA.A-SSE.A.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
MA.7.RP.A.2	Recognize and represent proportional relationships between quantities.
MA.7.RP.A.2a	Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
MA.7.RP.A.2c	Represent proportional relationships by equations.
MA.7.RP.A.3	Use proportional relationships to solve multistep ratio and percent problems.
MA.8.EE.C.7	Solve linear equations in one variable.
MA.8.EE.C.7a	Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
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.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
MA.A-CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
MA.A-REI.A.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
MA.7.G.A.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

MA.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Essential Questions

- How can mathematical models be used to clarify mathematical relationships?
- How can mathematical models be used to describe physical relationships?

Application of Knowledge and Skills...

Students will know that...

- 1. inverse operations can be used to solve equations.
- 2. a linear equation can have one solution, no solution, or infinite solutions.
- 3. two equal ratios form a proportion.
- 4. proportions can be solved using cross products.
- 5. similar figures are proportional.
- 6. scale models are used to represent life-sized models.
- 7. formulas are used to simplify and solve problems.

Students will be able to. . .

- a. solve one, two, and multi-step equations.
- b. solve equations with variables on both sides.
- c. find ratios and write and solve proportions.
- d. solve proportions using cross products.
- e. use similar figures to solve problems.
- f. solve percent problems and percent application problems.
- g. solve percent of change problems.
- h. rewrite equations and formulas.

Assessments

- Communicator Practice Diagnostic: Other written assessments Students will solve practice problems on communicators to receive immediate feedback
- Daily Warm-Up Problems Diagnostic: Other written assessments Students will complete daily warm-up

problems to assess readiness

- Quiz 1 Formative: Written Test Students will solve one, two, and multi-step equations with variables on both sides (including those with no real solutions and infinite solutions).
- Quiz 2 Formative: Written Test Students will take a quiz on proportion and percent problems including percent of change and application problems.
- Students will complete one or two problems to assess knowledge and skills learned during the class period
- Ticket to Leave Problems Formative: Other written assessments
- Unit Test Summative: Written Test Students will complete a test on all topics covered in the unit

Activities

Modeling One-Step Equations using Algebra Tiles

Students will use algebra tiles to model one-step equations using addition and subtraction.

Exploring Multi-step Equations Game

Students will play a game in small groups to practice solving equations.

Road Trip Project (with optional challenge questions)

Students will plan a road trip in the United States and will use their knowledge of scale and proportions to solve problems.

Kooshball Percent/Proportion Game

Students will play an interactive game with problems on percents and proportions.

Exploring Proportions in Similar Triangles Activity

Students will explore proportions that exist in similar triangles.

Capture-Recapture Activity

Students will complete an activity using dried beans to explore the capture-recapture method used with wildlife populations.

Investigating Percents of Change Activity

Students will compare their heart rate before and after exercising and calculate the percent of change.

Discovering Math: Ration and Proportions Video

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
  - Position student near helping peer or have quick access to teacher
  - Break tests down in smaller increments

- **Content specific modifications may include:**
  - Provide personal handout for integer rules
  - Provide graphic organizer for remembering angle relationships
  - Provide completed examples for practice work and homework.
  - Provide calculator to assist with calculations.
  - Provide students with a formula sheet with one type of problem for each formula worked out for them already.

Differentiation for ELL's:

- General modifications may include:
  - Strategy groups
  - Teacher conferences
  - Graphic organizers
  - Modification plan

- **Content specific vocabulary important for ELL students to understand include:** inverse operations, linear equations, infinite, proportions, ratios, product, scale, formula, equation, ratios

Differentiation to extend learning for gifted students may include:

- Challenge and enrichment homework, worksheets, and activity

- Optional weekly challenge problems

Integrated/Cross-Disciplinary Instruction

Resources

McDougal Littell Algebra 1 textbook and resource materials

Website: www.classzone.com (see link)

Kuta Software

Algebra with Pizzazz

Punchline Algebra

Smart Exchange Website (see link)

NJ Ask Review Workbook Grade 7

- McDougal Littel website
- Smart Exchange Website

21st Century Skills

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are

	excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.