Unit 8: Multi-Step Equations / Introduction to Slope (**A Look Ahead**)

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 35**
Length: **4 weeks**
Status: **Published**

Unit Overview

In this unit, students will be exposed to eighth grade topics focusing on multi-step equations with variables on both side and the idea of slope. To begin with, students will review the process for solving a multi-step equation involving distributing and combining like terms. Next, students will be introduced to the idea of solving a multi-step equation containing variables on both sides. Students will learn that they will continue following the same rules that they learned earlier in the year, but must first ensure to get the variable on one side of the equation after combining any like terms. Once students show comprehension of this idea they will be exposed to "special case equations". Students will learn what it means for an equation to have "no solution" or "infinite solutions". Students will then transition into linear equations and will learn how to manipulate equations so they are in the form "y =" (slope intercept form). Students will then learn the process of graphing a linear equation by creating an x/y table and plotting the resulting points on the coordinate plane. Next, students will be exposed to the concept of slope and how to calculate the slope when given a graph or two ordered pairs. Lastly, students will learn how to graph an equation by plotting the y intercept and using the slope to plot the remaining points on the line.

Standards

MA.8.EE.B.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
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.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.

Essential Questions

- How can we build upon our knowledge of solving equations to solve equations containing variables on both sides?
- Why is it beneficial to re-write equations in different forms?
- How are slope and unit rate one of the same?

- How is the formula for calculating the slope of two points derived?

Application of Knowledge: Students will know that...

- An equation can have "no solution" or "infinite solutions".
- An equation with infinite solutions occurs when your variable disappears and you are left with two constants that do equal each other (true statement).
- An equation with no solution occurs when your variable disappears and you are left with two constants that do not equal one another.
- Equations can contain variables on both sides of the equal sign.
- In order to move the variable from one side of the equation to the other you use inverse operations.
- The formula to calculate the slope of a line when given two points is: y2 - y1 / x2 - x1
- The graph of a linear equation results in a completely straight line.
- The letter "b" in the slope intercept form equation represents the y intercept.
- The letter "m" in the slope intercept form equation represents the slope.
- The slope intercept form of an equation is when the equation is written in the form y =.
- The slope of a line can be calculated on the graph by finding the ratio of the rise to the run of the line.
- The slope of a line is the ratio between the rise and the run of a line.
- When attempting to graph a linear equation you can create a table of values to get the ordered pairs that lie on the line.
- When graphing an equation in slope intercept form you begin by plotting the y intercept and using the slope to find other points that lie on the line.

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

- Calculate the slope of a line when given a graph or two ordered pairs.
- Graph a linear equation by creating a table of values.
- Graph a linear equation in slope intercept form by plotting the y intercept and using the slope to find other points on the line.
- Identify the slope and y intercept in a linear equation.
- Manipulate equations into the form y =.
- Solve "special case" equations that result in answers of "no solution" or "infinite solutions".
- Solve multi-step equations containing variables on both sides.

Assessments

- Do Now's: Will be used to check for prior knowledge and to determine mastery of particular topics. If needed the teacher will remediate the previous lesson before continuing.
- Tickets to leave: Will be used to measure student understanding of the lesson and assist in determining whether remediation is needed for the topic.

- Communicator Practice: Will be used as a quick whole-class assessment tool to check for complete comprehension.
- Unit Quiz: focusing only on all concepts from the equations/slope unit.
- 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. From this unit, students will be asked to graph a linear equation in slope intercept form.

Suggested Activities

- Digits launch activities (8th Grade Digits).
- Review games using communicators.
- Student centered SMART Board lessons: students will move and reveal steps that need to be followed in order to solve an equation.
- Straight line activity: students like going up to the SMART Board during the linear equations part of the unit to see who can draw the straightest line to represent the given equation.

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:**
    - Personal handout for remembering integer rules (can be taped to desk).
    - Graphic organizer for remembering integer rules.
    - Provide completed examples for practice work and homework.
    - Calculator to assist with calculations.
    - Step by step instructions for solving multi-step equations (printed on desk).

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, slope, solving for y, isolate, rate of change, ordered pair

Differentiation to extend learning for gifted students may include:

- When graphing by creating a table, focus more attention on problems containing fractions. Also, begin by having these students put the equation into slope intercept form first instead of giving them the equation already in slope intercept form.

Technology Integration

- iPads or Chromebooks as appropriate to the activity.
- Online learning components including use of the Digits digital textbook and resources.
- Teacher integration of the SMART board to facilitate active student engagement throughout the course of the lesson.
- Software or online programs that teachers may use to create students materials or generate problems such as Kuta software.
- Additional practice provided through the use of IXL.

Integrated/Cross-Disciplinary Instruction

ELA: Practice formulating complete and grammatically correct responses to open-ended questions.

Economics: Explain the idea of slope as the average change (gain OR loss) of a stock price (or value) per unit of time.

Resources

Digits teacher materials and support: www.pearsonrealize.com

Digits student access and support: www.mymathuniverse.com

IXL practice: www.ixl.com

Digits video examples

SMART Board lessons

Kuta software generated worksheets

21st Century Skills

CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.