Unit 3: Solving Equations

Content Area: **Mathematics**
Course(s): **Algebra 8**
Time Period: **November**
Length: **4 weeks**
Status: **Published**

Transfer

Big Idea: Solving Equations

Enduring Understandings

All of the facts of arithmetic and algebra follow from certain properties.

Variables in place of numbers allow the statement of relationship among numbers that are unknown or unspecified.

Useful information about equations and inequalities, including solutions, can be found by analyzing graphs or tables.

Essential Questions

How do I determine the best numerical representation (pictorial, symbolic objects) for a given situation?

Can equations that appear to be different be equivalent?

What kinds of relationships can proportions represent?

Critical Knowledge and Skills

Vocabulary

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Addition Property of Equality, Base, Conversion Factor, Cross Products, Cross Product Property, Division Property of Equality, Equivalent Equations, Exponent, Formula, Identity, Inverse Operations, Isolate, Literal Equations, Multiplication Property of Equality, Open Sentence, Percent Error, Percent Change, Percent Decrease, Percent Increase, Proportion, Power, Rate, Ratio, Relative Error, Scale, Scale Drawing, Scale Model, Similar Figures, Subtraction Property of Equality, Unit Analysis, Unit Rate

Learning Objectives

Solve one-step, two-step, and multi-step equations in one variable (A.CED.1, A.REI.1,3)

Solve equations with variables on both sides (A.CED.1, A.REI.1,3)

Identify equations that are identities or have no solutions (A.CED.1, A.REI.1,3)

Analyze the connection between solving linear equations to graphing systems (A.REI.11)

Rewrite and use literal equations and formulas (A.CED.4, A.REI.1, A.REI.3)

Convert units and rates (N.Q.2)

Solve and apply proportions (A.REI.3)

Find missing lengths in similar figures (A.CED.1, 8.G.3,4,5)

Solve equations with angle sums of triangles and angles of parallel lines cut by a transversal (8.G.5)

Solve percent problems using proportions and percent equations (A.CED.1, A.REI.3, N.Q.1)

Find percent change (N.Q.3)

Find the relative error in linear/nonlinear measurements (N.Q.3

Resources

Illuminations Algebra Tiles

Desmos: Connections of Solving Linear Equations & Graphing Systems of Linear Equations

Illuminations Pan Balance

Khan Academy: Solving Equations

Standards

RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP11. Use technology to enhance productivity.

9.1.8.A.2 Relate how career choices, education choices, skills, entrepreneurship, and economic conditions affect income.

9.1.8.C.5 Calculate the cost of borrowing various amounts of money using different types of credit (e.g., credit cards, installment loans, mortgages).

9.1.8.D.3 Differentiate among various investment options.

9.1.8.E.6 Compare the value of goods or services from different sellers when purchasing large quantities and small quantities.

9.2.8.B.7 Evaluate the impact of online activities and social media on employer decisions.

8.1.8.A.1 Demonstrate knowledge of a real world problem using digital tools.

8.2.8.C.8 Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.

MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.N-Q.A	Reason quantitatively and use units to solve problems.
MA.K-12.5	Use appropriate tools strategically.
MA.N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
MA.N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
MA.N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.A-CED.A	Create equations that describe numbers or relationships
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.

MA.A-CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
MA.8.G.A	Understand congruence and similarity using physical models, transparencies, or geometry software.
MA.A-REI.A	Understand solving equations as a process of reasoning and explain the reasoning
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.A-REI.B	Solve equations and inequalities in one variable
MA.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
MA.8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
MA.8.G.A.4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
MA.8.G.A.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
MA.A-REI.D	Represent and solve equations and inequalities graphically
MA.A-REI.D.11	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.