Unit Goals – Stage 1

**Number of Days:**
- **MS** 29 days 9/5/17 – 10/13/17
- **HS** 29 days 9/5/17 – 10/13/17

**Unit Description:** In this unit, students analyze and explain precisely the process of solving an equation. Students, through reasoning, develop fluency writing, interpreting, and translating between various forms of linear equations and inequalities, including literal and absolute-value equations.

**Materials:** algebra tiles, protractor

<table>
<thead>
<tr>
<th>Standards for Mathematical Practice</th>
<th>Transfer Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMP 1 Make sense of problems and persevere in solving them.</td>
<td>Students will be able to independently use their learning to…</td>
</tr>
<tr>
<td>SMP 2 Reason abstractly and quantitatively.</td>
<td>• Make sense of never-before-seen problems and persevere in solving them.</td>
</tr>
<tr>
<td>SMP 3 Construct viable arguments and critique the reasoning of others.</td>
<td>• Construct viable arguments and critique the reasoning of others.</td>
</tr>
<tr>
<td>SMP 4 Model with mathematics.</td>
<td></td>
</tr>
<tr>
<td>SMP 5 Use appropriate tools strategically.</td>
<td></td>
</tr>
<tr>
<td>SMP 6 Attend to precision.</td>
<td></td>
</tr>
<tr>
<td>SMP 7 Look for and make use of structure.</td>
<td></td>
</tr>
<tr>
<td>SMP 8 Look for and express regularity in repeated reasoning.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Standards for Mathematical Content Clusters Addressed</th>
<th>Making Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>[m]</strong> A-CED.A Create equations that describe numbers or relationships.</td>
<td><strong>ESSENTIAL QUESTIONS</strong></td>
</tr>
<tr>
<td><strong>[m]</strong> A-REI.A Understand solving equations as a process of reasoning and explain the reasoning.</td>
<td>Students will keep considering…</td>
</tr>
<tr>
<td><strong>[m]</strong> A-REI.B Solve equations and inequalities in one variable.</td>
<td>• How can equations and inequalities be used to model, analyze, and solve real-world and mathematical problems?</td>
</tr>
<tr>
<td><strong>K</strong> A-REI.C Rearrange formulas to highlight a quantity of interest.</td>
<td>• How can you justify a solution path when solving equations and inequalities?</td>
</tr>
<tr>
<td><strong>K</strong> A-REI.D Solve absolute value equations and inequalities.</td>
<td>• How is solving linear equations in one variable with numeric coefficients and solving linear equations in one variable with letter coefficients similar?</td>
</tr>
<tr>
<td><strong>K</strong> A-REI.E Graph the solution(s) to absolute value equations and inequalities and interpret them in context.</td>
<td>• How do you solve absolute value equations and inequalities?</td>
</tr>
</tbody>
</table>

**Acquisition**

**KNOWLEDGE**
**Students will know…**
- The definition of academic vocabulary words, such as *extraneous solution* and *literal equations*.
- You can add, subtract, multiply, or divide both sides of an equation by the same nonzero number and the two sides will remain equal.
- The solutions to equations and inequalities can be represented on a number line.

**SKILLS**
**Students will be skilled at and/or be able to…**
- Explain solution steps for solving linear equations in one variable.
- Create and solve linear equations and inequalities in one variable to represent a situation.
- Solve linear equations in one variable with letter coefficients (literal equations).
- Rearrange formulas to highlight a quantity of interest.
- Solve absolute value equations and inequalities.
- Graph the solution(s) to absolute value equations and inequalities and interpret them in context.
# Unit 1 Equations and Inequalities
### Assessed Grade Level Standards

#### Standards for Mathematical Practice
- **SMP 1** Make sense of problems and persevere in solving them.
- **SMP 2** Reason abstractly and quantitatively.
- **SMP 3** Construct viable arguments and critique the reasoning of others.
- **SMP 4** Model with mathematics.
- **SMP 5** Use appropriate tools strategically.
- **SMP 6** Attend to precision.
- **SMP 7** Look for and make use of structure.
- **SMP 8** Look for and express regularity in repeated reasoning.

#### Standards for Mathematical Content

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A-CED.A</strong></td>
<td>Create equations that describe numbers or relationships. [Linear, quadratic, and exponential]</td>
</tr>
<tr>
<td>A.CED.1</td>
<td>Create equations and inequalities in one variable including ones with absolute value and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. CA*</td>
</tr>
<tr>
<td>A.CED.4</td>
<td>Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm’s law $V = IR$ to highlight resistance $R$.*</td>
</tr>
<tr>
<td><strong>A-REI.B</strong></td>
<td>Solve equations and inequalities in one variable. [Linear inequalities; literal equations that are linear in the variables being solved for; quadratics with real solutions.]</td>
</tr>
<tr>
<td>A.REI.3</td>
<td>Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</td>
</tr>
<tr>
<td>A.REI.3.1</td>
<td>Solve one variable equations and inequalities involving absolute value, graphing the solutions and interpreting them in a context. CA</td>
</tr>
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</table>

**Key:**
- **[m]** = major clusters; **[s]** = supporting clusters, **[a]** = additional clusters
- * Indicates a modeling standard linking mathematics to everyday life, work, and decision-making
- **CA** Indicates a California-only standard
## Evidence of Learning – Stage 2

### Assessment Evidence

#### Unit Assessment

**Claim 1:** Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency. Concepts and skills that may be assessed in Claim 1:

- **A-CED.A**
  - The student creates equations and inequalities in one variable, including ones with absolute value, and uses them to solve problems.
  - The student rearranges formulas to highlight a quantity of interest.

- **A-REI.A**
  - The student constructs a viable argument to justify a solution method when solving linear equations in one variable.
  - The student clearly and precisely constructs viable arguments to support their own reasoning and critique the reasoning of others.

- **A-REI.B**
  - The student solves linear equations and inequalities in one variable with numeric coefficients.
  - The student solves linear equations in one variable with letter coefficients (literal equations).
  - The student solves one variable equations and inequalities involving absolute value, graphs the solutions, and interprets them in a context.

**Claim 2:** Students can solve a range of well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies. Standard clusters that may be assessed in Claim 2:

- **A-CED.A**
- **A-REI.B**

**Claim 3:** The student can clearly and precisely construct viable arguments to support their own reasoning and critique the reasoning of others. Standard clusters that may be assessed in Claim 3:

- **A-REI.A**

**Claim 4:** The student can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems. Standard clusters that may be assessed in Claim 4:

- **A-CED.A**
- **A-REI.A**
- **A-REI.B**

### Other Evidence

#### Formative Assessment Opportunities

- Informal teacher observations
- Checking for understanding using active participation strategies
- Exit slips/summaries
- Tasks

# Unit 1 Equations and Inequalities

## Learning Plan – Stage 3

### Suggested Sequence of Key Learning Events and Instruction

<table>
<thead>
<tr>
<th>Days</th>
<th>Learning Target</th>
<th>Expectations</th>
<th>Big Ideas Math Algebra 1 (Explorations and Lessons)</th>
<th>Supplemental Resources</th>
</tr>
</thead>
</table>
| 1 day | I will explore solving equations by participating in the Opening Task. | **OPENING TASK – Mystery Letters**  
This Opening Task can be done as a Solo-Team-Teach activity. First have students work independently, and then have students share their reasoning about the task with their team. After working together, facilitate a class discussion about the task utilizing Talk Moves. This task provides you with information about what the students know about solving equations from previous grades and is a gateway into the entire unit on equations and inequalities. |  | Conceptual Understanding:  
- Mystery Letters |
| 4-5 days | I will review equations by… | - Solving simple equations, multi-step equations, and equations with variables on both sides of the equal sign.  
- Creating equations to describe numbers or relationships in a context. (SMP 2)  
- Constructing a viable argument to justify my solution method. (SMP 3)  
- Answering questions such as…  
  o How do you solve simple and multi-step equations?  
  o How do you solve equations with variables on both sides of the equal side?  
  o Synergy Item Bank: Item ID 50537, 50645 | - Section 1.1  
- Section 1.2  
- Section 1.3 | Conceptual Understanding:  
- Create an Equation Given a Solution Set Task  
Procedural Skills and Fluency:  
- Equations with Variables on Both Sides Solo-Team-Teach  
- Multi-Step Equations Carousel  
- Solving Multi-Step Linear Equations Tic-Tac-Toe  
- Khan Academy: Solving equations with one unknown |
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| 6-7 days | I will solve linear equations in one variable by… | - Creating and solving absolute value equations.  
- Graphing and interpreting the solutions of absolute value equations in the context of the situation. (SMP 2)  
- Solving literal equations, including formulas to highlight a quantity of interest. (SMP 7, SMP 8)  
- Constructing a viable argument to justify my solution method. (SMP 3)  
- Answering questions such as…  
  - How do you solve an absolute value equation?  
  - Compare and contrast solving equations with numeric coefficients to equations with variable coefficients.  
  - Synergy Item Bank: Item ID 54482, 54974, 57317, 69159, 64305, 76195, 76657, 76663 | - Section 1.4  
- Section 1.5  
- STEM Video: Dead Reckoning | Conceptual Understanding:  
- Absolute Value Equations Scenarios  
- Absolute Value Equations Task  

Procedural Skills and Fluency:  
- Equations and Formulas Task  
- Literal Equations Tic-Tac-Toe  
- Khan Academy: Solving absolute value equations  

Application:  
- Building Financial Literacy: Dinner at Pepe’s  
- Fantasy Football Task  
- Pen Pal Task  
- STEM Video Performance Task: Dead Reckoning |

| 2-3 days | I will check my understanding of solving equations by participating in the FAL. | **FORMATIVE ASSESSMENT LESSON**  
- Building and Solving Complex Equations (SMP 1, 5, 6, 7, 8) |  |  |
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<tr>
<td>11-12 days</td>
<td>I will solve linear inequalities in one variable by…</td>
<td>• Reviewing writing and graphing inequalities and solving simple inequalities.</td>
<td>• Section 2.1</td>
<td>Conceptual Understanding:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Creating inequalities in one variable to describe numbers or relationships in a context. (SMP 2)</td>
<td>• Section 2.2</td>
<td>• Solving Inequalities Using a Number Line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solving multi-step inequalities.</td>
<td>• Section 2.3</td>
<td>• Create an Inequality Given a Solution Set Task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Graphing the solution set on a number line.</td>
<td>• Section 2.4</td>
<td>• Reasoning with Linear Inequalities Task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Interpreting a solution set in the context of the situation. (SMP 2)</td>
<td>• Section 2.5</td>
<td>• Desmos: Compound Inequalities on the Number Line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solving compound and absolute value inequalities.</td>
<td>• Section 2.6</td>
<td>• Desmos: Absolute Value Inequalities on the Number Line</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Answering questions such as…</td>
<td>STEM Video: Planning Electrical Circuits</td>
<td>• Investigating Absolute Value Inequalities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o How do you solve an inequality in one variable?</td>
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<td></td>
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<td>o Compare and contrast solving equations to solving inequalities.</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o What does the solution set represent in the context of the situation?</td>
<td></td>
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<tr>
<td></td>
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<td>o How do you solve absolute value inequalities?</td>
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<tr>
<td></td>
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<td>o Synergy Item Bank: Item ID 24348, 64307</td>
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<tr>
<td>1-2 days</td>
<td>I will prepare for the unit assessment on solving equations and inequalities by…</td>
<td>• Incorporating the Standards for Mathematical Practice (SMPs) along with the content standards to review the unit.</td>
<td>• Ch. 1 Review (p. 44 – 46)</td>
<td></td>
</tr>
</tbody>
</table>

| 1 day     |                                                                                  |                                                                                                         | • Ch. 2 Review (p. 94 – 96)                          |                       |

**Unit Assessment**  
Students will take the Synergy Online Unit Assessment.  
Unit Assessment Resources ([Word](#) or [PDF](#)) can be used throughout the unit.