Unit 5 Equations and Inequalities

**Unit Goals – Stage 1**

**Number of Days:** 25 days  
3/6/17 – 4/7/17

**Unit Description:** Students will write, interpret, and use equations as they reason about and solve one-step equations in one variable. Students will know that the solution of an equation is the value of the variable that makes the equation true. Students will also learn about inequalities and graph the solution of a one-variable inequality on a number line to represent all the values in the solution. They will also write an equation to express one quantity, thought of as the dependent variable, in terms of the other variable, thought of as the independent variable in two-variable equations.

**Materials:** coordinate grid*, number line*, graph paper*, algebra tiles*  
(* Paper tool available at LBUSD Curriculum Intranet → Instructional Tools → Middle School → Mathematical Tools)

<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>Making Meaning</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>
</tr>
</tbody>
</table>

**Standards for Mathematical Content Clusters Addressed**

| m 6.EE.B | Reason about and solve one-variable equations and inequalities. Represent and analyze quantitative relationships between dependent and independent variables. |
| m 6.EE.C | |

**Understanding**

**Students will understand that...**

- Equations and inequalities can be used to represent real-world situations.
- Solving an equation and an inequality is a process of answering a question: which values, if any, make the equation/inequality true?
- Equations can be written with one, two, or more variables depending on the real-world situation they describe. Two-variable equations have a dependent and independent variable.

**Essential Questions**

**Students keep considering...**

- How can equations and inequalities be used to model, analyze, and solve mathematical and real life word problems?
- How can you determine whether a number is a solution of an equation or inequality?
- Compare and contrast solving equations and inequalities.

**Knowledge**

**Students will know...**

- The definition of academic vocabulary words, such as inequalities, independent and dependent variables, and inverse operations.
- 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 solution set of an inequality represents all of the solutions that make the inequality statement true.

**Skills**

**Students will be skilled at and/or be able to...**

- Write and solve one-variable equations and inequalities in real-world and mathematical problems.
- Solve one-step equations in one variable.
- Use substitution to check the solutions in one variable equations and inequalities.
- Write a two-variable equation to express one quantity versus another quantity using dependent and independent variables.
- Identify the relationship between dependent and independent variables from graphs and tables and relate them to equations.
- Represent solutions of 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

| [m] 6.EE.B | Reason about and solve one-variable equations and inequalities. |
| 6.EE.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. |
| 6.EE.6 | Use variables to represent numbers and write expressions when solving a real-world or mathematical problems; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. |
| 6.EE.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. |
| 6.EE.8 | Write an inequality of the form \( x > c \) or \( x < c \) to represent a constraint or condition in a real-world or mathematical problems. Recognize that inequalities of the form \( x > c \) or \( x < c \) have infinitely many solutions; represent solutions of such inequalities on number line diagrams. |

| [m] 6.EE.C | Represent and analyze quantitative relationships between dependent and independent variables. |
| 6.EE.9 | Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation \( d = 65t \) to represent the relationship between distance and time. |

Key: [m] = major clusters; [s] = supporting clusters; [a] = additional clusters
## Evidence of Learning – Stage 2

### 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:

- **6.EE.B**
  - The student uses substitution in one-variable equations and inequalities.
  - The student writes one-variable equations and inequalities and solves one-variable equations in real-world and mathematical problems.
  - The student represents solutions of inequalities in real-world and mathematical problems on a number line.

- **6.EE.C**
  - The student writes an equation to express one quantity in terms of another quantity using dependent and independent variables.
  - The student identifies the relationship between dependent and independent variables from graphs and tables and relates these to the equations.

**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:
- **6.EE.B**
- **6.EE.C**

**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:
- **6.EE.B**
- **6.EE.C**

**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:
- **6.EE.B**
- **6.EE.C**

### Other Evidence

**Formative Assessment Opportunities**

- Tasks
- Informal teacher observations
- Checking for understanding using active participation strategies
- Exit slips/Summaries
- Modeling Lessons (SMP 4)

- Formative Assessment Lessons (FAL)
- Quizzes/Chapter Tests
- Big Ideas Math Performance Tasks
- SBAC Interim Assessment Blocks

Access [Using Formative Assessment for Differentiation](#) for suggestions. Located on the LBUSD website – “M” Mathematics – Curriculum Documents
<table>
<thead>
<tr>
<th>Days</th>
<th>Learning Target</th>
<th>Expectations</th>
<th>Big Ideas Math Course 1 (Activities and Lessons)</th>
<th>Curriculum Intranet</th>
</tr>
</thead>
</table>
| 1 day     | I will explore equations and inequalities by participating in the Opening Task. | **OPENING TASK – True, False, or Open Equation**<br>This Opening Task builds on students’ prior knowledge of equations from elementary school. This activity is a gateway into the entire unit of equations and inequalities.<br>(SMP 7 and 8) | **Conceptual Understanding:**<br>  - True, False, or Open Equation  
  - Solving Equations Video | **Conceptual Understanding:**<br>  - True, False, or Open Equation  
  - Solving Equations Video |
| 2-3 days  | I will define an equation by…                                                   | - Comparing and contrasting algebraic expressions with equations.<br> - Writing equations to represent real-world problems. (SMP 2)<br> - Answering questions such as…<br>  o What is the difference between an expression and an equation?<br>  o How can you write an equation to represent a real-world situation?<br>  o Synergy Item Bank: Item ID 50200 | **Section 7.1**<br>(Activities 1 and 2; Examples 1, 2, and 3)                                                                                   | **Conceptual Understanding:**<br>  - True, False, or Open Equation  
  - Solving Equations Video |
| 5-6 days  | I will solve one-step equations in the form \( x + p = q \) and \( px = q \) for cases in which \( p \), \( q \), and \( x \) are all nonnegative rational numbers by… | - Using algebra tiles to understand the process of solving one-step equations. (SMP 5)<br> - Using inverse operations to isolate the variable.<br> - Explaining that solving an equation is the process of answering a question: which values, if any, make the equation true? (SMP 3)<br> - Using substitution to determine whether a given number makes an equation true.<br> - Solving equations that contain fractions and decimals as coefficients.<br> - Answering questions such as…<br>  o How do you determine whether a number is a solution to an equation?<br>  o Explain how to solve an equation using inverse operations. (SMP 3)<br>  o Compare and contrast solving an equation using inverse operations and using substitution.<br>  o Synergy Item Bank: Item ID 51388, 53045, 53028, 57350 | **Section 7.2**<br>(Activities 1, 2, and 3; Examples 1, 2, 3, and 4)<br> **Section 7.3**<br>(Activities 2 and 3; Examples 1, 2, and 3) | **Procedural Skills and Fluency:**<br>  - Write About It!: Solving Equations by Adding |
## 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 Course 1 (Activities and Lessons)</th>
<th>Curriculum Intranet</th>
</tr>
</thead>
</table>
| 2-3 days | I will check my understanding of equations by participating in the FAL. | **FORMATIVE ASSESSMENT LESSON**  
- Interpreting Equations  
  (SMP 1, 2, 4, 6, 7, 8) | | |
| 2-3 days | I will write equations in two variables by… |  
- Using variables to represent two quantities in a real-world problem that change in relationship to one another. (SMP 2)  
- Writing an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable.  
- Analyzing the relationship between the dependent and independent variables using graphs and tables, and relating these to the equation.  
- Answering questions such as…  
  o How can you write an equation in two variables?  
  o Synergy Item Bank: Item ID 52303, 52969 |  
- Section 7.4  
  (Activities 1 and 2; Examples 1, 2, 3, and 4) |  
Conceptual Understanding:  
- Chocolate Bar Sales Task  
- Families of Triangles Task |
### 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 Course 1 (Activities and Lessons)</th>
<th>Curriculum Intranet</th>
</tr>
</thead>
</table>
| 7-8 days | I will write an inequality in the form $x > c$ or $x < c$ by…                   | • Comparing and contrasting one-variable equations and inequalities.  
• Explaining that solving an inequality is a process of answering a question: which values, if any, make the inequality true? (SMP 3)  
• Using substitution to determine whether a given number in a specified set makes an inequality true.  
• Recognizing that inequalities have infinitely many solutions and represent a constraint or condition in a real-world problem.  
• Solving one-step inequalities.  
• Representing solutions of inequalities on number lines.  
• Answering questions such as…  
  o How can you represent solutions of inequalities on a number line?  
  o How are inequalities similar to and different from equations?  
  o Synergy Item Bank: Item ID 53146, 53472 | • Section 7.5 (Activities 1 and 2; Examples 1, 2, 3, and 4)  
• STEM Video: Designing a CubeSat  
• Section 7.6 (Activities 1, 2, and 3; Examples 1, 2, and 3)  
• Section 7.7 (Activities 1, 2, and 4; Examples 1, 2, and 3) | Conceptual Understanding:  
• Solving Inequalities with a Moveable Arrow  
Application:  
• STEM Performance Task: Launching a Cubesat |
| 1 day    | I will prepare for the unit assessment on equations and inequalities by…       | • Incorporating the Standards for Mathematical Practice (SMPs) along with the content standards to review the unit.                                                                                       | • Ch. 7 Study Help (p. 322)  
• Ch. 7 Review (p. 345–347)  
• Ch. 13 Review (p. 591) | Application:  
• Performance Task: Bees  
• Performance Task: County Fair |

---

**Unit Assessment**  
**Synergy: 2016-17 Math 6 Unit 5**  
or  
**LBUSD Math Intranet/Assessment**

At this point, all standards addressed in the Math 6 SBAC Interim Assessment Block – Expressions and Equations have been covered. This block may now be administered.