

Unit 1 Title	Estimated Time Frame
Solving Equations and Inequalities and Linear Equations	40 days or 20 blocks
Big Idea (s)	
Build upon experiences with operations with integers and fractions. Build upon experiences of solving linear equations and inequalities. Analyze and explain the process of solving an equation. Interpret functions given graphically, numerically, symbolically, and verbally. Translate between representations and understand the limitations of various functions. Work with functions given by graphs and tables.	
Essential Question(s)	
What general strategies can you use to solve simple equations? How can we solve for an unknown quantity or find an unknown in a real-world situation? How can linear functions be used to model situations and solve problems?	
<b>Standards for Mathematical Practice (MP.)</b> - The practice standards in bold describe expertise to be intentionally developed in this unit.	<b>Kentucky Interdisciplinary Literacy Practices (KILP.)</b> - The practice standards in bold describe expertise to be intentionally developed in Mathematics.
MP.1. Make sense of problems and persevere in solving them. <b>MP.2. Reason abstractly and quantitatively.</b> <b>MP.3. Construct viable arguments and critique the reasoning of others.</b> <b>MP.4. Model with mathematics.</b> <b>MP.5. Use appropriate tools strategically.</b> MP.6. Attend to precision. <b>MP.7. Look for and make use of structure.</b> <b>MP.8. Look for and express regularity in repeated reasoning.</b>	KILP.1 Recognize that text is anything that communicates a message. KILP.2 Employ, develop, and refine schema to understand and create text. KILP.3 View literacy experiences as transactional, interdisciplinary and transformational. KILP.4 Utilize receptive & expressive language arts to better understand self, others, and the world. KILP.5 Apply strategic practices, with scaffolding & then independently, to approach new literacy tasks. <b>KILP.6 Collaborate with others to create new meaning.</b> <b>KILP.7 Utilize digital resources to learn and share with others.</b> <b>KILP.8 Engage in specialized, discipline specific literacy practices.</b> <b>KILP.9 Apply high level cognitive processes to think deeply and critically about text.</b> KILP.10 Develop a literacy identity that promotes lifelong learning.

**Common Preconceptions/Misconceptions**

- Some students may miscalculate the slope. Remind students that the slope is measuring the steepness of a line, so the change in height comes first when you read slope as a fraction.
- Some students may incorrectly use (2,0) instead of (0,2) when interpreting the value of  $b$ . Have students check whether the equation is valid for the coordinate they use to represent the y-intercept.
- Some students often reverse the independent variable and the dependent variable  $y$  when given data.
- Students not only simplify problems, but they will also need to use vocabulary, such as terms, coefficients, and degrees, appropriately as they describe their process.
- Students will need to describe the meaning of parts of an expression, such as a particular term or coefficient, and also explain the meaning of the full expression).
- Students will fluently manipulate expressions into equivalent forms based on patterns they have noticed across problems Using Algebra Tiles, and Algeblocks is recommended.

KAS Standards	Considerations	Samples of Learning Intentions and Success Criteria
<b>KY.HS.A.12</b> Create equations and inequalities in one variable and use them to solve problems. <b>MP.1, MP.4</b>	<b>Considerations:</b> Students use the addition, subtraction, multiplication and division properties for both equations and inequalities to solve problems. These equations may arise from linear and quadratic functions and simple rational and exponential functions.	I am learning to write equations and inequalities ( <b>Topic 1</b> ) <ul style="list-style-type: none"> <li>• I can create linear equations with one variable using the properties of equality</li> <li>• I can explain that each step in solving a linear equation follows from the equality in the previous step</li> </ul>
<b>KY.HS.A.15</b> Rearrange formulas to solve a literal equation, highlighting a quantity of interest, using the same reasoning as in solving equations. <b>MP.2, MP.7</b>	<b>Considerations:</b> Students encounter scenarios where they rewrite formulas/equations for variables different from the commonly used formulas. An example may include, but not being limited to, students rearranging the area of a rectangle ( $A = bh$ ) to highlight the base value $b$ , rather than the total area.	I am learning to rearrange formulas using variables and numbers. ( <b>Lesson 1-4</b> ) <ul style="list-style-type: none"> <li>• I can rearrange formulas and equations to highlight a quantity of interest by isolating the variable using the same reasoning used to solve equations.</li> <li>• I can use formulas and equations to solve problems.</li> </ul>
<b>KY.HS.A.16</b> Understand 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. <b>MP.1, MP.3</b>	<b>Considerations:</b> Students reason with and about collections of equivalent expressions to see how all the expressions in the collection are linked together through the properties of operations.	I am learning to justify equivalence in solving equations. ( <b>Lesson 1-2</b> ) <ul style="list-style-type: none"> <li>• I can explain that each step in solving a linear equation follows from the equality in the previous step</li> </ul>

<p><b>KY.HS.A.18</b> Solve linear equations and inequalities in one variable, including literal equations with coefficients represented by letters. <b>MP.2, MP.7.</b></p>	<p><b>Considerations:</b> Students use all properties of both equations and inequalities to solve for one variable.</p>	<p>I am learning to solve equations. <b>(Lesson 1-2, 1-3, 1-4, 1-5, 1-6)</b></p> <ul style="list-style-type: none"> <li>• I can create and solve linear equations with one variable using the properties of equality</li> <li>• I can explain that each step in solving a linear equation follows from the equality in the previous step</li> <li>• I can create and solve inequalities in one variable</li> <li>• I can interpret solutions to inequalities within the context</li> </ul>
<p><b>KY.HS.A.25</b> Graph linear inequalities in two variables. <b>MP.5, MP.6</b> a. Graph the solutions to a linear inequality as a half-plane (excluding the boundary in the case of a strict inequality).</p>	<p><b>Considerations:</b> Students recall skills regarding graphing the solutions of a linear inequality in the coordinate plane in order to graph the solution set for a system of linear inequalities.</p> <p>Students utilize these skills in other standards via linear programming.</p>	<p>I am learning to graph inequalities <b>(Lesson 4-5)</b></p> <ul style="list-style-type: none"> <li>• I can create and solve inequalities in two variables.</li> <li>• I can interpret solutions to inequalities within the context.</li> <li>• I can identify inequalities as true or false based on the number of solutions</li> </ul>
<p><b>Supporting Standards</b></p>		
<p><b>KY.HS.N.3 (+)</b> Justify why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. <b>MP.3, MP.6 (Lesson 1-1)</b></p> <p><b>KY.HS.N.4</b> Use units in context as a way to understand problems and to guide the solution of multi-step problems; ★ <b>MP.5, MP.6</b> a. Choose and interpret units consistently in formulas; b. Choose and interpret the scale and the origin in graphs and data displays.</p> <p><b>KY.HS.N.5</b> Define appropriate units in context for the purpose of descriptive modeling. ★ <b>MP.1, MP.6</b></p> <p><b>KY.HS.N.6</b> Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★ <b>MP.2, MP.6</b></p> <p><b>KY.HS.A.1</b> Interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions, given a context, by viewing one or more of their parts as a single entity. <b>MP.2, MP.6</b> Students encounter simpler scenarios where they interpret <math>r \cdot t</math> as the product of a given rate and time or interpret the perimeter expression <math>(2l+2w)</math> contextually as the sum of twice the length and twice the width of a rectangle.</p> <p><b>KY.HS.A.23</b> Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane. <b>MP.1, MP.4</b></p>		

**KY.8.EE.2** Use square root and cube root symbols to represent solutions to equations of the form  $x^2 = p$  and  $x^3 = p$ , where  $p$  is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that perfect squares and perfect cubes are rational. **MP.5, MP.6**

**KY.8.EE.7** Solve linear equations in one variable.

**a.** 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).

**b.** Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms. **MP.2, MP.3, MP.7**

### Essential Vocabulary

**equation** - A mathematical statement that says that two expressions have the same value; any number sentence with an  $=$ . EX:  $4+2=3+3$

**expression** - A finite combination of symbols that are well-formed according to the rules applicable in the context at the end.

**coefficient** - A constant that multiplies a variable.

**variable** - A letter used to represent a number value in an expression or an equation. EX: "x" in  $x+2=4$ .

**inequality** - A mathematical expression that shows that two quantities are not equal.

**slope** - a constant rate of change

### Common Assessment

Common Assessment Unit 1 Algebra One

### Anchor Resources

enVision Topic 1 - Solving Equations and Inequalities	enVision Topic 2 - Linear Equations
<p><b>MILC Resources</b> - <a href="#">MILC Resources - Solving Equations and Inequalities</a></p> <p><b>Formative Assessment Lesson (FAL)</b> - (one per semester as a minimum):</p> <p><b>FAL</b> - <a href="#">Interpreting Algebraic Expressions</a></p> <p><b>FAL</b> - <a href="#">Solving Linear Equations in One Variable</a></p> <p><b>FAL</b> - <a href="#">Solving Linear Equations in Two Variables</a></p> <p><b>3 ACT Math Task (one per unit)</b> Collecting Cans</p>	<p><b>MILC Resources</b> - <a href="#">MILC Resources - Linear Equations</a></p> <p><b>3 ACT Math Task (one per unit)</b> How Tall is Tall?</p> <p><b>STEM (one per semester)</b> - <i>Solar Panels</i> Suggested</p> <p>Supplement - Average Rate of Change</p>

I can statements for enVision Topics [for Algebra I](#)

**I can statements for Math Practices**

\*Disclaimer: Success Criteria is the evidence students must produce to demonstrate learning. This example is not comprehensive.

\*\* Mathematical Practices (A.MP.1- 8) should be evidenced at some point throughout each unit, depending on the explored tasks. It is important to note that MP. 2 should support learning in every lesson.

\*\*\* **Modeling Standards:** Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★). The star symbol sometimes appears on the heading for a group of standards; in that case, it should be understood to apply to *all* standards in that group.