Unit 3 Title	**Estimated Time Frame**
Systems of Linear Equations and **Congruence** and **Similarity**	**45 days**

Big Idea (s)

Analyze and solve linear equations and pairs of simultaneous linear equations.
Understand congruence and similarity using physical models, transparencies, or geometry software.

Essential Question(s)

What does it mean to solve a system of linear equations?
How does using a model (such as a graph or table) assist us in finding the slope of a line?
How does using a model help us to solve systems of linear equations?
How does determining one solution, infinitely many solutions, or no solutions to an equation assist in knowing the reasonableness of answers?
How can you show that two figures are either congruent or similar to one another?
What do transformations represent?
How can I use a model to show congruences exist when parallel lines are cut by a transversal?

Standards for Mathematical Practice (MP.) - The practice standards in bold describe expertise to be intentionally developed in this unit.	**Kentucky Interdisciplinary Literacy Practices (KILP.) -** The practice standards in bold describe expertise to be intentionally developed in Mathematics.
MP.1. Make sense of problems and persevere in solving them. **MP.2. Reason abstractly and quantitatively.** **MP.3. Construct viable arguments and critique the reasoning of others.** **MP.4. Model with mathematics.** **MP.5. Use appropriate tools strategically.** MP.6. Attend to precision. **MP.7. Look for and make use of structure.** **MP.8. Look for and express regularity in repeated reasoning.**	KILP.1 Recognize that text is anything that communicates a message. KLIP.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. **KILP.6 Collaborate with others to create new meaning.** **KILP.7 Utilize digital resources to learn and share with others.** **KILP.8 Engage in specialized, discipline specific literacy practices.** **KILP.9 Apply high level cognitive processes to think deeply and critically about text.** KILP.10.Develop a literacy identity that promotes lifelong learning.

Common Preconceptions/Misconceptions		
Solving pairs of simultaneous linear equations builds on the skills and understanding students used to solve linear equations with one variable. Systems of linear equations may also have one solution, an infinite number of solutions, or no solutions). Students discover these cases as they graph systems of linear equations and solve them algebraically. Students may have difficulty understanding the only change in a translation is the placement of the shape. The shape's size and orientation stay the same. Encourage students to use rules to follow the lines from pre-image to image if they are having trouble with transformations.		
KAS Standards	**Sample Learning Intentions**	**Sample Success Criteria**
8.EE.8 Analyze and solve pairs of simultaneous linear equations. a Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs because points of intersection satisfy both equations simultaneously. b Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6. c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair. **MP.1, MP.3, MP.4**	**Considerations:** Examples are both mathematical and real-life contexts. Emphasis is on determining what types of contexts lead to having no solutions or infinitely many solutions. Students use tables, graphs, and equations to explain why a graphed system has infinitely many or no solutions. Elimination and/or matrices are <u>not required</u> for grade 8. Emphasis is on choosing a method. Students solve simple cases. Solving systems algebraically will be limited to at least one equation containing at least one variable with a coefficient of 1. Coherence KY.7.EE.2→ KY.8.EE.8→ KY.HS.A.20	We are learning to understand systems of equations. (**Lesson 5-1**) ● I can determine if a system has 1, 0, or infinite solutions. We are learning to solve systems of equations by graphing. (**Lesson 5-2**) ● I can determine the solution to a system of equations by examining a graph. (The solution is the point at which the lines intersect.) We are learning to solve systems of equations by substitution.(**Lesson 5-3**) ● I can solve systems by substituting one equation into the other, solving for one of the variables, then solving for the other variable.

KY.8.G.1 Verify the properties of rotations, reflections, and translations experimentally: • Lines are congruent to lines. • Line segments are congruent to line segments of the same length. • Angles are congruent to angles of the same measure. • Parallel lines are congruent to parallel lines. **MP.5, MP.6**	**Considerations:**Emphasis is congruence transformations preserve corresponding congruent lines, segments, and angles. Coherence KY.8.G.1→ KY.HS.G.3(+)	We are learning how to translate a two-dimensional figure on a coordinate plane. (**Lesson 6-1**) ● I can use coordinates on a coordinate plane to describe the rules of a translation. ● I can translate a two-dimensional figure on a coordinate plane by mapping each of its vertices. We are learning how to reflect a two-dimensional figure on a coordinate plane. (**Lesson 6-2**) ● I can use coordinates on a coordinate plane to describe the rules of a reflection. ● I can reflect a two-dimensional figure on a coordinate plane by mapping each coordinate. We are learning how to rotate a two-dimensional figure on a coordinate plane (**Lesson 6-3**) ● I can rotate a two-dimensional figure on a coordinate plane by mapping its coordinates. ● I can use coordinates on a coordinate plane to describe the rules of a reflection.
KY.8.G.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations. Given two congruent figures, describe a sequence exhibiting congruence between them. **MP.2, MP.7**	**Considerations:** Students understand a figure, called a pre-image, is congruent to another figure, called the image if the second figure can be obtained by a sequence of congruence transformations performed on the first figure. Students describe the sequence of congruence transformations necessary to transform one figure to a congruent second figure. **Coherence KY.8.G.2→ KY.HS.G.5**	We are learning to understand congruent figures on a coordinate plane. (**Lesson 6-5**) ● I can use a sequence of translations, reflections, and rotations to show that figures are congruent.
KY.8.G.3 Describe the effect of dilations, translations, rotations, and reflections on	**Considerations:** Emphasis on noticing patterns across examples and noting how the x and y	We are learning how to describe transformations of two-dimensional figures on a coordinate

two-dimensional figures using coordinates. **MP.3, MP.5, MP.6**	values change for different transformations. Coherence KY.8.G.3→ KY.HS.G.9	plane. (**Lessons 6-1, 6-2, 6-3, 6-6**) ● I can use coordinates on a coordinate plane to describe the rules of translation, reflection, rotation, or dilation (mapping). ● I can use a scale factor to enlarge or reduce a figure on a coordinate plane. We are learning to compose transformation. (**Lesson 6-4**) ● I can describe and perform a sequence of transformations. ● I can apply my knowledge of transformations to solve problems.
KY.8.G.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. **MP.2, MP.5, MP.7**	**Considerations:**If similar, non-congruent figures are given, students understand a dilation must occur in the sequence of transformations to obtain the image from the preimage. Coherence KY.8.G.4→ KY.HS.G.10	We are learning to understand similar figures. (**Lesson 6-7**) ● I can use a sequence of reflections, translations, dilations, and rotations to show that figures are similar.
KY.8.G.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for the similarity of triangles. **MP.3**	**Considerations:** Students use technology or physical tools to explore triangles. They arrange three copies of the same triangle so that the sum of the three angles appears to form a line and give an argument in terms of transversals of why this is so. Coherence KY.7.G.5→ KY.8.G.5→ KY.HS.G.10	We are learning about the relationship between angles, lines, and transversals. (**Lesson 6-8**) ● I can identify angle pairs created when parallel lines are cut by a transversal. ● I can find the measures of angles formed by parallel lines and a transversal. We are learning about the angle sum and exterior angles of triangles. **(Lesson 6-9)** ● I can identify and find measures of a triangle's interior and exterior angles. ● I can write and solve equations to find angle measures. We are learning about angle-angle triangle similarity. **(Lesson 6-10)** ● I can compare angle measures of triangles to determine if they are similar.

		• I can solve problems involving similar triangles.

Supporting Standards

Students continue their work from grade 6 and grade 7, from solving one and two-step equations to those involving systems.

Essential Vocabulary

system of equations - Two or more linear equations in the same variables.
solution - The value of a variable that makes an equation true.
substitution -Replacement of a variable with an equal expression or constant.
adjacent angles - Two angles that share both a side and a vertex.
alternate interior angles - When two lines are crossed by another line (called a transversal), the pairs of angles on opposite sides of the transversal but inside the two lines are called alternate interior angles.
corresponding angles - When a transversal crosses two lines, the angles in matching corners are called corresponding angles.
congruent - Two plane or solid figures are congruent if one can be obtained from the other by rigid motion. Having the same size and shape.
dilation - A transformation that moves each point along the ray through the point emanating from a fixed center and multiplies distances from the center by a common scale factor.
exterior angle - An exterior angle is the angle between one side of a polygon and the extension of an adjacent side. A triangle's exterior angle equals the sum of the opposite interior angles.
interior angle - An angle whose sides are determined by two consecutive sides of a polygon.
line of symmetry - A line across the figure such that the figure can be folded along the line into matching parts; a line that divides a geometric figure into two congruent portions.
parallel lines - Coplanar lines that do not intersect.
perpendicular lines - A line that forms a right angle with another line or segment.
reflection - A transformation resulting from a flip.
rotation - A transformation in which a figure is rotated through a given angle, about a point.
scale factor - A number that multiplies some quantity; the ratio of any two corresponding lengths in two similar geometric figures.
similar polygons - Two polygons are similar if their corresponding sides are proportional.
supplementary - Two angles are supplementary if their sum is 180 degrees.
transformation - A change in a geometric figure's position, shape, or size.
translation - A transformation, or change in position, resulting from a slide with no turn.
transversal - A line that intersects two other lines.
vertical angles - A pair of opposite angles formed by intersecting lines.

Common Assessment

Common Assessment Unit 3 Grade 8 Math

Anchor Resources

enVision Topic 5 - Analyze and Solve Systems of Linear Equations	enVision Topic 6 - Congruence and Similarity
MILC - MILC Topic 8 resources - **MILC 8th Grade Systems Resources** **FAL** (one per semester): ● **Solving Linear Equations in One Variable** *Recommended for Second Semester FAL* ● **Comparing Value for Money: Baseball Jerseys** *This FAL has students to look and analyze other student sample work (not a card sort, for example) and is beneficial and encouraged!* Recommend Lesson 5-2 before 5-1 **3-Act Math: Ups and Downs**	**MILC -** MILC Topic 6 resources - **MILC Congruence and Similarity Resources** **FAL** (one per semester): ● **Identifying Similar Triangles** ● **Representing and Combining Transformations** (lessons divided into two units of instruction) Helpful hints for instruction include: ● 6.1 - 6.7 Transformations ● Supplement one day of equations ● THEN 6.8 - 6.10 Angles (vocabulary is very important) **3-Act Math: Tricks of the Trade**

*****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 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.