FCPS 2024-2025 Math Unit Framework

Kentucky Academic Standards - Math 6-8

Unit 3 Title	**Estimated Time Frame**
Systems of Linear Equations and **Congruence** and **Similarity**	**Approximately 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 graph help us to solve systems of linear equations?
How does determining a solution to a system of equations assist in assessing 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		
Systems of Equations- being aware of which variable they are substituting and watching for grouping symbols and negatives Solutions of Systems of Equations- students struggle to interpret the meaning of the solution in context Geometric Transformations- Identifying a rule when given the PreImage and the Image; Fail to verify that the shape remained the same (example- plot one point one space too far) Dilations- Students assume a fraction means the shape will get smaller (Example: 3/2) Angles of a Triangle- identifying remote interior angles Parallel Lines and Transversals- graphic organizer will assist with vocabulary		
KAS Standards	**Prerequisite Skill, Considerations, and Coherence**	**Sample Learning Intentions and Success Criteria**
Cluster: Analyze and solve linear equations and pairs of simultaneous linear equations.		
KY.8.EE.8 Analyze and solve pairs of simultaneous linear equations. ☐ **Conceptual** ☐ **Procedural** ☐ **Application** 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; understand that a system of two linear equations may have one solution, no solution, or infinitely many solutions. ☐ **Conceptual** ❑ Procedural ❑ Application b. Solve systems of two linear equations in two variables algebraically by using substitution where at least one equation contains at least one variable whose coefficient is 1 and by inspection for simple cases. ☐ **Conceptual** ☐ **Procedural** ❑ Application c. Solve real-world and mathematical problems leading to two linear equations in two variables. ❑ Conceptual ☐ **Procedural** ☐ **Application** **MP.1, MP.3, MP.4, KILP.1, KILP.3, KILP.8**	**Considerations:** a. 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. b. For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6. **Elimination method is <u>not required</u>** Coherence KY.7.EE.2→ KY.8.EE.8→ KY.HS.A.20	We are learning to understand systems of equations. ● I can identify the solutions to a system of equations by finding the point of intersection on the graph. ● I can explain why the point of intersection of the graph of two linear equations is the solution to the system of equations. ● I can explain why a system of equations could have 1, 0, or infinite solutions. ● I can determine what contexts lead to having no solutions or infinitely many solutions. We are learning to solve systems of equations by substitution. ● I can solve systems by substituting one equation into the other, solving for one of the variables, then solving for the other variable. We are learning to solve real-world and mathematical problems involving two linear equations. ● I can analyze a situation to create a system of equations. ● I can solve a system of equations.

Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software.		
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. ☐ Conceptual ❑ Procedural ❑ Application **MP.5, MP.6, KILP.7, KILP.8** *Supporting Standard KY.8.G.3*	**Considerations:** Emphasis is congruence transformations preserve corresponding congruent lines, segments, and angles. Coherence KY.8.G.1→ KY.HS.G.3(+)	We are learning to verify the properties of rotations, reflections, and translations experimentally. ● I can describe and perform rotations, reflections, and translations on a coordinate plane. ● I can use tools to experimentally verify the properties of rotations, reflections, and translations. ● I can explain why these transformations preserve the congruence of lines, line segments, angles, and parallel lines. ● I can use coordinates on a coordinate plane to describe the rules of translation, reflection, rotation, or dilation (mapping).
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. ☐ Conceptual ☐ Procedural ❑ Application **MP.2, MP.6, MP.7, KILP.2, KILP.7** *Supporting Standard KY.8.G.3*	**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. ● I can describe a pre-image and an image. ● I can use a sequence of translations, reflections, and rotations to show that figures are congruent. ● I can describe the sequence to transform one figure to a congruent second figure. ● I can use coordinates on a coordinate plane to describe the rules of translation, reflection, rotation, or dilation (mapping).

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. ☐ Conceptual ☐ Procedural ❑ Application **MP.2, MP.5, MP.7, KILP.2, KILP.7** *Supporting Standard KY.8.G.3*	**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. ● I can use a sequence of reflections, translations, dilations, and rotations to show that figures are similar. ● I can explain why a figure is similar to another. ● I can use coordinates on a coordinate plane to describe the rules of translation, reflection, rotation, or dilation (mapping).
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. ☐ Conceptual ❑ Procedural ❑ Application **MP.3, KILP.1, KILP.6**	**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 angle sum and exterior angles of triangles. ● I can explain why the sum of the interior angles of a triangle is 180 degrees using informal arguments. ● I can explain using informal arguments why the measure of an exterior angle of a triangle is equal to the sum of the measures of the two non-adjacent interior angles. We are learning about the relationship between angles created when parallel lines are cut by transversals. ● I can identify angle pairs created when parallel lines are cut by a transversal. ● I can explain the relationships between these angles. We are learning about angle-angle criterion to determine triangle similarity. ● I can explain if triangles are similar using the angle-angle criterion.

Essential Vocabulary

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.
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.
corresponding angles - When a transversal crosses two lines, the angles in matching corners are called corresponding angles.
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.
similar polygons - Two polygons are similar if their corresponding sides are proportional.
solution - The value of a variable that makes an equation true.
substitution -Replacement of a variable with an equal expression or constant.
supplementary angles - Two angles are supplementary if their sum is 180 degrees.
system of equations - Two or more linear equations in the same variables.
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.

Supporting Standard

KY.8.G.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. **MP.3, MP.5, MP.6**
Considerations: Emphasis on noticing patterns across examples and noting how the x and y values change for different transformations.

☐ **Conceptual** ❑ Procedural ❑ Application

Coherence KY.8.G.3→ KY.HS.G.9

Benchmark Assessment

Resources
Standard Resource Pages Hyperlinked to Each Standard **enVision Crosswalk Unit 3** **enVision Language Support Handbook** **Three Reads Routine** **Notice and Wonder Routine** **MILC Resources**

*****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.