High School Geometry FCPS 2025-2026 Math Unit Framework Topic 3

Geometry Topic 3: Transformations	Estimate Time Frame: 7 Block Days
Essential Standards: G.2.a, G.2.c, G.4 Assessment Resource: enVision Topic 3 and Formative Assessment Lesson: **FAL** Representing and Combining Transformations	

FCPS Supporting Links	Additional Supporting Links
Pacing Guide enVision Geometry Standards Crosswalk Resource FCPS P-12 Mathematics Guidance Document FCPS Achievement & Trauma-Informed Strategies in the Classroom	Kentucky Academic Standards KSA Blueprint Target of the Standards - conceptual, procedural & application Three-Reads Routine Notice and Wonder Routine **MILC Resources Topic 3** ***enVision Geometry Teacher Guide: page 104A to 104D for specific Topic 3 Focus-Coherence-Rigor***

Big Idea
Transformation geometry studies how shapes relate to each other through various motions, such as translation, rotation, reflection, and dilation.

Essential Questions	Common Preconceptions/Misconceptions
•What are the properties of the four types of rigid motion? •How can transformations be used to generate new, congruent figures? •How can I perform a reflection with/without the coordinate plane? •How can I perform a rotation with/without the coordinate plane? •How can I perform a translation? •How can I perform a dilation?	• Prerequisites: Use reflections, rotations, and translations to determine if an image can be a transformation of a preimage. • Students may try to find the translation from the image to the preimage. • Remember, rotations are always counterclockwise. • Remember, do the transformations in reverse order from the notation.

•What are the properties of the four types of rigid motion? •What are some ways to represent a transformation, such as a reflection? •What observations do you make about transformations such as reflections, rotations, and translations? •How does a rotation about he origin differ from a rotation about any point other than the origin? •What are some ways to represent a transformation visually? • What do you notice about the order of composing two translations? **Theorems/Postulates:** •Reflection in x–axis •Reflection in y–axis •Reflection in y = x •Rotation 90° counterclockwise about origin •Rotation 270° counterclockwise about origin •Rotation 180° about origin •Translations (left/right/up/down) •Compositions of transformations (including glide reflection) •Dilations (enlarge/reduce)	• Students may have difficulty giving equations for lines of reflection that are vertical or horizontal. Remind them that horizontal lines have slope zero, and vertical lines have no slope. Show them that the lines can be written by identifying the intercept. • The negative numbers in the translation rule may confuse students. • Students understand that a figure, called a pre-image, is congruent to another figure, called the image, if that second figure can be obtained by a sequence of congruence transformations performed on the first figure. Students can draw the image of a transformed pre-image using a variety of tools, including but not limited to: • graph paper • manipulatives • tracing paper • computer programs
Standards for Mathematical Practices	**Kentucky Interdisciplinary Literacy Practices (KILP)**

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.** ***enVision Teacher Guide: page 104D for specific Math Practice suggestions***	1. Recognize that text is anything that communicates a message. 2. Employ, develop, and refine schema to understand and create text. 3. View literacy experiences as transactional, interdisciplinary, and transformational. 4. Utilize receptive and expressive language arts to better understand self, others, and the world. **5. Apply strategic practices, with scaffolding and then independently, to approach new literacy tasks.** **6. Collaborate with others to create new meaning.** **7. Utilize digital resources to learn and share with others.** **8. Engage in specialized, discipline-specific literacy practices.** **9. Apply high-level cognitive processes to think deeply and critically about text.** 10. Develop a literacy identity that promotes lifelong learning. *Incorporating texts into math instruction fosters interdisciplinary learning for a more engaging educational experience.*

Essential Standards	Sample Learning Intentions & Success Criteria	HQIR/Resource Considerations
Cluster: Experiment with transformations in the plane.		
KY.HS.G.2 Representing transformations in the plane. a. **Describe** transformations as functions that take points in the plane as inputs and give other points as outputs. ☐ Conceptual ❑ Procedural ❑ Application b. **Compare** transformations that preserve distance and angle measures to those that do not. ☐ Conceptual ❑ Procedural ❑ Application	We are learning to represent transformations in the plane and describe transformations as functions. ● I can **describe** transformations as functions that take points in the plane as inputs and give other points as outputs, using appropriate mathematical language and notation. We are learning to compare transformations that preserve distance and angle measures to those that do not. ● I can define a rigid transformation.	A Whale of a Time Step #1 can be completed before starting the Topic. Graph the pre-image for the performance task for Topic #3 for homework before 3-1. ● Topic 3-1 A Whale of a Time Step #2-3 ● Topic 3-2 A Whale of a Time Step #4 ● Topic 3-3 A Whale of a Time Step #5

c. Given a rectangle, parallelogram, trapezoid, or regular polygon, formally **describe** the rotations and reflections that carry it onto itself, using properties of these figures. **MP.5, MP.7, KILP.7, KILP.8** *Supporting Standards: KY.HS.G.3 (+), KY.HS.N.5*	• I can **compare** and contrast transformations that preserve distance and angle measures to those that do not, using appropriate mathematical language and notation. (i.e., rigid vs. non-rigid) • I can model transformations as functions and describe points in the plane as inputs and outputs. We are learning to use the properties of geometric figures to describe rotations and reflections. • I can define rotation, reflection, translation, and parts of polygons such as vertices, angles, and line segments. • I can **describe** the rotations and reflections that carry a regular polygon onto itself using appropriate mathematical language and notation.	Remember, rotations are counterclockwise.
Cluster: Experiment with transformations in the plane.		
KY.HS.G.4 Understand the effects of transformations of geometric figures. a. Given a geometric figure and a rotation, reflection, or translation, **draw** the transformed figure. b. **Specify** a sequence of transformations that will carry a given figure onto another. c. **Use** geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure. Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. **MP.2, MP.8**	We are learning to understand the effects of transformations on geometric figures and • I can identify and describe the effects of rotations, reflections, and translations on geometric figures. • I can **draw** the transformed figure when given a geometric figure and a specified rotation, reflection, or translation. • I can **specify** a sequence of transformations to **carry one** given figure onto another. We are learning to apply geometric descriptions of rigid motions to predict and draw transformed figures. • I can **use** geometric descriptions of rigid motions to predict the effect of a given rigid	• Topic 3-1 • Topic 3-2 • Topic 3-3 • Topic 3-4 A Whale of a Time Step #6 • Topic 3-5 and • Topic 7-1 A Whale of a Time Step #7-8 Only teach dilations from the origin. • Recommended FAL to use with Topic 3 - Transformations

Supporting Standards: KY.HS.G.3 (+), KY.HS.G.2, KY.HS.G.29, KY.HS.G.21 □ Conceptual ❑ Procedural ❑ Application	motion on a given figure. ● I can use the definition of congruence in terms of rigid motions to determine if two figures are congruent.	FAL Representing and Comparing Transformations: https://www.map.mathshell.org/download.php?fileid=1696 Use this FAL "after" 3-5 and as a Review before the Common Assessment 1. ● If teachers use the "Whale" project as a test grade for Topic 3, then the **FAL** will be the perfect culminating task for the Unit (Topic 3). ● STEM Task: "Create an Animation" Page 106 ● 3 ACT Math Task: The Perplexing Polygon (use with review or as "anytime" activity.

Attending to the Standards for Mathematical Practice

- Demonstrate knowledge of congruence and symmetry through transformations.
- Software, transparencies, etc., may be used to accurately represent congruence transformations in the plane.
  a. Students understand that any point (a,b) can be thought of as an input, and any image of point (a,b) can be thought of as the output of a specific transformation function.
  b. Students connect which transformations are a rigid motion (isometry) and which transformations do not have that characteristic.
  c. Students practice and understand the procedures needed to carry out multiple transformations that carry the figure onto itself, recognizing the essential properties of these figures.
- Apply these concepts to analyze and solve problems involving transformations of geometric figures effectively.

Supporting Standards

Emphasis is on congruence transformations that preserve corresponding congruent lines, segments, and angles.
KY.HS.N.5 Define appropriate units in context for the purpose of descriptive modeling. ★ **MP.1, MP.6**

KY.HS.G.3 (+) Develop formal definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **MP.6, MP.7**

KY.HS.G.29 Use geometric shapes, their measures, and their properties to describe objects in real-world settings. **MP.1, MP.4**

KY.HS.G.31 Apply geometric methods to solve design problems. ★ **MP.1, MP.4**

Vocabulary

preimage, image, reflection, rotation, translation, vector, component form, composition of transformations, glide reflection, dilation, scale factor, line of symmetry, rotational symmetry, point symmetry

Reflection in x-axis
Reflection in y–axis
Reflection in y = x
Rotation 90° counterclockwise about the origin
Rotation 270° counterclockwise about the origin
Rotation 180° about origin
Translations (left/right/up/down)
Compositions of transformations (including glide reflection)
Dilations (enlarge/reduce)

*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.