High School Geometry FCPS 2025-2026 Math Unit Framework Topic 8

Geometry Topic 8: Right Triangles and Trigonometry	Estimate Time Frame: 8 Block Days
Essential Standards: G.11, G.12 Assessment Resource: End of Unit Common Assessment Folder and Formative Assessment Lesson: **FAL** - Proving the Pythagorean Theorem	

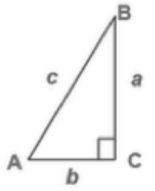
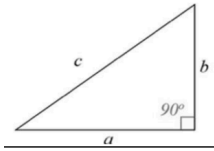
FCPS Supporting Links	Additional Supporting Links
Pacing Guide enVision Geometry Standards Crosswalk Resource FCPS P-12 Mathematics Guidance Document FCPS Achievement & Trauma-Informed Strategies in the Classroom	Kentucky Academic Standards KSA Blueprint Target of the Standards - conceptual, procedural & application Three-Reads Routine Notice and Wonder Routine **MILC Resources Topic 8** ***enVision Geometry Teacher Guide: page 346A to 346D for specific Topic 8 Focus-Coherence-Rigor***

Big Idea
The angle measures and side lengths within a right triangle have many special relationships (Pythagorean Theorem, trigonometric ratios).

Essential Questions	Common Preconceptions/Misconceptions
•How are the Pythagorean Theorem and trigonometry useful? •How do trigonometric ratios relate angle measures to side lengths of right triangles? •How can algebra be used to express geometric properties? •What relationships exist among the sides and angles of a right triangle? •How can right triangles be used to model and solve	• Before starting Topic 8-1, some students may find it helpful to review simplifying single radicals, operations with radicals, and rationalizing the denominator. • Students use previously learned definitions, theorems, postulates, and properties of lines, angles, and triangles to draw conclusions and to make inferences. • Students should have seen the formulas in these standards in the middle

real-world problems?	grades. What is different for high school students in Advanced Geometry is that these students are asked to justify with formal and informal proofs. ● Students should explore with models.
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 346D for specific Math Practice suggestions***	1. Recognize that text is anything that communicates a message. 2. Employ, develop, and refine schemas 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: Define trigonometric ratios and solve problems involving right triangles.		
KY.HS.G.12 Understand the properties of right triangles. a. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles (sine, cosine, and tangent). ☐ Conceptual ❑ Procedural ❑ Application	We are learning to apply the triangle theorems to solve problems. ● I can use the Pythagorean Theorem to find missing sides in right triangles. ● I can use the Converse of the Pythagorean Theorem to classify a triangle as acute, right, or obtuse.	● Topic 8-1 Include Pythagorean Triples; ● Topic 8-2 ● Topic 8-5

b. Explain and use the relationship between the sine and cosine of complementary angles. ☐ Conceptual ☐ Procedural ❑ Application c. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. ★ ☐ Conceptual ☐ Procedural ☐ Application **MP.3, MP.4, KILP.6, KILP.7, KILP.9** *Supporting Standards: KY.HS.G.13 (+) & KY.HS.G.14 (+), KY.HS.G.29*	• I can find missing sides in 30°-60°-90° special right triangles. • I can find missing sides in 45°-45°-90° special right triangles. We are learning to explain and use trigonometric relationships. • I can explain sine and cosine relationships. • I can use sine equals cosine of complementary angles to solve problems. We are learning to apply trigonometric ratios to solve problems involving right triangles. • I can use trigonometry to find missing sides in right triangles. • I can use trigonometry to find missing angles in right triangles. • I can use SOH-CAH-TOA to find the sine, cosine, and tangent of a triangle's acute angle.	 $\sin A = \frac{\text{opposite side}}{\text{hypotenuse}} = \frac{a}{c}$ $\cos A = \frac{\text{adjacent side}}{\text{hypotenuse}} = \frac{b}{c}$ $\tan A = \frac{\text{opposite side}}{\text{adjacent side}} = \frac{a}{b}$  $c^2 = a^2 + b^2$
Cluster: Prove theorems involving similarity.		
KY.HS.G.11 Understand theorems about triangles. a. Apply theorems about triangles. ☐ Conceptual ☐ Procedural ❑ Application b. (+) Prove theorems about triangles. ☐ Conceptual ☐ Procedural ❑ Application **MP.1, MP.3, KILP.1, KILP.3, KILP.8** *Supporting Standards: KY.HS.G. 5, KY.HS.G.7 KY.HS.G.10*	We are learning to develop an understanding of theorems about triangles and their applications. • I can apply theorems related to triangles, including the Pythagorean theorem.	• Topic 8-1 • STEM Activity: "Measure a Distance" page 348

Attending to the Standards for Mathematical Practice

- Given various similar triangles, students compare the ratios of corresponding pairs of sides to discover the definitions of trigonometric ratios for acute angles (MP.3).
- Students use these trigonometric ratio definitions to solve real-world problems involving right triangles, connecting their solutions to the problem posed (MP.4).

Supporting Standards

KY.HS.G.13 (+) Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. **MP.6, MP.7** Area of triangle = ½ ab sin(C)

KY.HS.G.14 (+) Understand and apply the Law of Sines and the Law of Cosines. a. Use the Law of Sines and Cosines to find unknown measurements in right and non-right triangles. b. Prove the Laws of Sines and Cosines and use them to solve problems. **MP.1, MP.3**

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

Vocabulary

Triangle and Trig Vocabulary: Pythagorean Theorem, radical, angle of depression, angle of elevation, 30-60-90 triangle, 45-45-90 triangle, trigonometry, sine, cosine, tangent, Pythagorean triple, trigonometric ratios

Triangle Theorems/Postulates:
•The Pythagorean Theorem and Its Converse
•Ratios of sides in 30°-60°-90° special right triangles
•Ratios of sides in 45°-45°-90° special right triangles
•SOH-CAH-TOA

*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.