FCPS 2024-2025 Math Unit Framework

Kentucky Academic Standards - Math 6-8

Unit 4 Title	**Estimated Time Frame**
Pythagorean Theorem and Volume	**Approximately 35 days**

Big Idea (s)

Understand and apply the Pythagorean Theorem.
Solve real-world mathematical problems involving the volume of cylinders, cones, and spheres.

Essential Question(s)

How can you use the Pythagorean Theorem to solve real-world problems?
How are the formulas for cylinder, cone, and sphere volume related?

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.** 10.Develop a literacy identity that promotes lifelong learning.

Common Preconceptions/Misconceptions

Pythagorean Theorem- confusing a,b, and c (hypotenuse is always opposite the right triangle) and use on right triangles only
Distance of a line: finding the length of the lengths within the given scale on a graph
Volume- Format of correct answer (in terms of pi, correct units, correct rounding); Identifying radius when given diameter, exponents in the formula

KAS Standards	Prerequisite Skill, Considerations, and Coherence	Samples of Learning Intentions and Success Criteria
Cluster: Understand and apply the Pythagorean Theorem.		
KY.8.G.6 Explain a proof of the Pythagorean Theorem and its converse. ❑ **Conceptual** ❑ Procedural ❑ Application **MP.3, MP.7, KILP.1, KILP.2, KILP.8**	**Considerations:** Students verify, using a model, that the sum of the squares of the legs is equal to the square of the hypotenuse in a right triangle. Students understand if the sum of the squares of the two smaller legs is equal to the square of the third leg, then the triangle is a right triangle. Coherence KY.7.G.6→ KY.8.G.6→KY.HS.G.11	We are learning to understand the Pythagorean Theorem ● I can describe the Pythagorean Theorem. ● I can verify, using a model, that the sum of the squares of the legs is equal to the square of the hypotenuse in a right triangle. ● I can use the converse of the Pythagorean Theorem to verify right triangles.
KY.8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. ❑ Conceptual ❑ **Procedural** ❑ **Application** **MP.1, MP.2, MP.4, KILP.3, KILP.9**	**Considerations:** Students apply the Pythagorean Theorem to real-world mathematical problems. For example, finding the width of a television given the length and diagonal distance (two-dimensional) and the distance from the top left rear corner of a prism to the bottom right front corner of the prism (three-dimensional). Coherence KY.8.G.7→KY.HS.G.12	We are learning to apply my knowledge of the Pythagorean Theorem to solve real-world problems. ● I can use the Pythagorean Theorem to find an unknown side length (leg or hypotenuse) of a right triangle in two dimensions. ● I can use the Pythagorean Theorem to find an unknown side length (leg or hypotenuse) in three dimensions. ● I can use the Pythagorean Theorem to solve real-world problems.
KY.8.G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. ❑ Conceptual ❑ **Procedural** ❑ Application **MP.5, MP.6, KILP.2, KILP.8**	**Considerations:** Students calculate distances on the coordinate plane between two non-vertical or non-horizontal points by applying the Pythagorean Theorem. Students calculate distances between two non-vertical or non-horizontal points not given on a coordinate plane by applying the Pythagorean Theorem to absolute horizontal and vertical distances the student calculates. Coherence KY.8.G.8→ KY.HS.G.21	We are learning to apply the Pythagorean Theorem to find distances on a coordinate plane. ● I can plot points on a coordinate plane to form a right triangle. ● I can determine the lengths of the legs of the triangle. ● I can use the Pythagorean Theorem to determine the triangle's hypotenuse, which is the distance between the two original points.

Cluster: Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.

KY.8.G.9 Apply the formulas for the volumes and surface areas of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

❑ **Conceptual** ☐ **Procedural** ☐ **Application**

MP.1, MP.7, MP.8, KILP.3, KILP.5, KILP.9

Formulas from Test Nav KY Practice Tests

Figure	Volume	Surface Area
Cone	$V = \frac{1}{3}\pi r^2 h$	$SA = \pi r\left(r + \sqrt{(r^2 + h^2)}\right)$
Cylinder	$V = \pi r^2 h$	$SA = 2\pi rh + 2\pi r^2$
Sphere	$V = \frac{4}{3}\pi r^3$	$SA = 4\pi r^2$

Coherence KY.7.G.4→ KY.8.G.9→ KY.HS.G.25

We are learning how to find the volume of three-dimensional figures to solve mathematical and real-life problems.

- I can use the formula for the volume of cylinder V= πr²h to solve problems.
- I can use the formula for the volume of a cone V= ⅓ πr²h to solve problems.
- I can use the formula for the volume of a sphere V = 4/3πr²h to solve problems.
- I can use the formulas for surface area of cones, cylinders, and spheres to solve problems.

Essential Vocabulary

area - interior space of a two-dimensional object
cone - a solid or hollow object which tapers from a circular or roughly circular base to a point
converse - The interchanging of the "if" and "then" parts of a conditional statement.
cylinder - a solid or hollow object having the shape of a cylinder
diameter - distance from one point, across the circle, through the center
height - vertical distance from the top to the base
pi - mathematical constant with an approximation of 3.14
Pythagorean Theorem - "The theorem that relates the three sides of a right triangle: a^2 + b^2 = c^2".
radius - the distance from the edge of a circle to the center
right triangle - A triangle in which one angle is a right angle. The relation between the sides and angles of a right triangle is the basis for trigonometry.
sphere - a round, solid figure with every point equidistant from it's center\
volume - the space occupied within the boundaries of a three-dimensional figure

Benchmark Assessment

Resources
Standard Resource Pages Hyperlinked to Each Standard **enVision Crosswalk Unit 4** **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.