

Kentucky Department of Education

Course Standards for 2019-2020 and Beyond



Kentucky Department of
EDUCATION

Course Code: 270401

Course Name: Geometry

Grade Level: 9-12

Course standards documents are designed to show how specific standards align to courses. For instructional planning and assessment, please access the complete [Kentucky Academic Standards for Mathematics](#) for the full scope of what students should know and be able to do.

Upon course completion students should be able to:

Standards

Standards for Mathematical Practice

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Modeling Standards: Modeling links classroom mathematics and statistics to everyday life, work, and decision-making. Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions. Quantities and their relationships in physical, economic, public policy, social, and everyday situations can be modeled using mathematical and statistical methods. When making mathematical models, technology is valuable for varying assumptions, exploring consequences, and comparing predictions with data. 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 high school standards are listed in conceptual categories:

- Number and Quantity (N)
- Algebra (A)
- Functions (F)
- Geometry (G)

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Standards

- Statistics and Probability (SP)

Conceptual Category Number and Quantity (N) – Standards

KY.HS.N.5

Define appropriate units in context for the purpose of descriptive modeling. ★

KY.HS.N.6

Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. ★

Conceptual Category Geometry (G) – Standards

KY.HS.G.1

Know and apply precise definitions of the language of Geometry:

- Understand properties of line segments, angles and circle.
- Understand properties of and differences between perpendicular and parallel lines.

KY.HS.G.2

Representing transformations in the plane.

- Describe transformations as functions that take points in the plane as inputs and give other points as outputs
- Compare transformations that preserve distance and angle measures to those that do not.
- Given a rectangle, parallelogram, trapezoid, or regular polygon, formally describe the rotations and reflections that carry it onto itself, using properties of these figures.

KY.HS.G.4

Understand the effects of transformations of geometric figures.

- Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure.
- Specify a sequence of transformations that will carry a given figure onto another.
- 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.

KY.HS.G.5

Know and apply the concepts of triangle congruence:

- Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

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- b. Explain how the criteria for triangle congruence (ASA, SAS and SSS) follow from the definition of congruence in terms of rigid motions.

KY.HS.G.6

Apply theorems for lines, angles, triangles, parallelograms.

KY.HS.G.7

Prove theorems about geometric figures.

- a. Construct formal proofs to justify theorems for lines, angles and triangles.

KY.HS.G.8

Create and apply geometric constructions.

- a. Make formal geometric constructions with a variety of tools and methods.
b. Apply basic construction procedures to construct more complex figures.

KY.HS.G.9

Understand properties of dilations.

- a. Verify the properties that result from that dilations given by a center and a scale factor.
b. Verify that a dilation produces an image that is similar to the pre-image.

KY.HS.G.10

Apply the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

KY.HS.G.11

Understand theorems about triangles.

- a. Apply theorems about triangles.
c. Use similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

KY.HS.G.12

Understand properties of right triangles.

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- 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).
- b. Explain and use the relationship between the sine and cosine of complementary angles.
- c. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

KY.HS.G.15

Verify using dilations that all circles are similar.

KY.HS.G.16

Identify and describe relationships among angles and segments within the context of circles involving:

- a. Recognize differences between and properties of inscribed, central and circumscribed angles.
- b. Understand relationships between inscribed angles and the diameter of a circle.
- c. Understand the relationship between the radius of a circle and the line drawn through the point of tangency on that radius.

KY.HS.G.19

Understand the relationship between the algebraic form and the geometric representation of a circle.

- a. Write the equation of a circle of given center and radius using the Pythagorean Theorem.

KY.HS.G.21

Use coordinates to justify and prove simple geometric theorems algebraically.

KY.HS.G.22

Justify and apply the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.

KY.HS.G.23

Find measurements among points within the coordinate plane.

- a. Use points from the coordinate plane to find the coordinates of a midpoint of a line segment and the distance between the endpoints of a line segment.
- b. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

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KY.HS.G.24

Use coordinates within the coordinate plane to calculate measurements of two dimensional figures.

- a. Compute the perimeters of various polygons.
- b. Compute the areas of triangles, rectangles and other quadrilaterals. ★

KY.HS.G.25

Analyze and determine the validity of arguments for the formulas for the various figures and shapes.

- a. Finding the circumference and area of a circle.
- b. Finding the volume of a sphere, prism, cylinder, pyramid and cone.

KY.HS.G.27

Use volume formulas to solve problems for cylinders, pyramids, cones, spheres, prisms. ★

KY.HS.G.28

Identify the shapes of two-dimensional cross-sections of three-dimensional objects and identify three-dimensional objects generated by rotations of two-dimensional objects.

KY.HS.G.29

Use geometric shapes, their measures and their properties to describe objects in real world settings.

KY.HS.G.30

Apply concepts of density based on area and volume in modeling situations, using appropriate units of measurement.

KY.HS.G.31

Apply geometric methods to solve design problems. ★