GEOMETRY CONCEPTS MISSOURI COURSE LEVEL EXPECTATIONS

Course Description

Geometry Concepts [0681] (1 unit, Gr. 9-12) Geometry Concepts will require students to explore geometric situations and develop their explanations of geometric relationships, moving towards formal mathematical arguments. With guidance, students will use deductive reasoning in the analysis of topics such as parallel lines, circles, polygon congruence, similarity, area, volume, and probability. Students receiving credit for this course cannot also receive math credit for Geometry or Geometry Honors. **Prerequisite**: Teacher Recommendation.

Mathematical Practices:

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

Congruence (CO)	
G.CO.A	**Experiment with transformations in the plane.**
G.CO.A.1	Define angle, circle, perpendicular line, parallel line, line segment and ray based on the undefined notions of point, line, distance along a line and distance around a circular arc.
G.CO.A.2	Represent transformations in the plane, and describe them as functions that take points in the plane as inputs and give other points as outputs.
G.CO.A.3	Describe the rotational symmetry and lines of symmetry of two-dimensional figures.
G.CO.A.4	Develop definitions of rotations, reflections and translations in terms of angles, circles, perpendicular lines, parallel lines and line segments.
G.CO.A.5	Demonstrate the ability to rotate, reflect or translate a figure, and determine a possible sequence of transformations between two congruent figures.
G.CO.B	**Understand congruence in terms of rigid motions.**
G.CO.B.6	Develop the definition of congruence in terms of rigid motions.
G.CO.B.7	Develop the criteria for triangle congruence from the definition of congruence in terms of rigid motions.

G.CO.C	**Prove geometric theorems.**
G.CO.C.8	Prove theorems about lines and angles.
G.CO.C.9	Prove theorems about triangles.
G.CO.C.10.	Prove theorems about polygons.
G.CO.D	**Make geometric constructions.**
G.CO.D.11	Construct geometric figures using various tools and methods.
Similarity, Right Triangles, and Trigonometry (SRT)	
G.SRT.A	**Understand similarity in terms of similarity transformations.**
G.SRT.A.1	Construct and analyze scale changes of geometric figures.
G.SRT.A.2	Use the definition of similarity to decide if figures are similar and to solve problems involving similar figures.
G.SRT.A.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
G.SRT.B	**Prove theorems involving similarity.**
G.SRT.B.4	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
G.SRT.C	**Define trigonometric ratios, and solve problems involving right triangles.**
G.SRT.C.5	Understand that side ratios in right triangles define the trigonometric ratios for acute angles.
G.SRT.C.6	Explain and use the relationship between the sine and cosine of complementary angles.
G.SRT.C.7	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles.
G.SRT.C.8	Derive the formula A = 1/2 ab sin(C) for the area of a triangle.
Circles (C)	
G.C.A	**Understand and apply theorems about circles.**
G.C.A.1	Prove that all circles are similar using similarity transformations.
G.C.A.2	Identify and describe relationships among inscribed angles, radii and chords of circles.
G.C.A.3	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.

G.C.B	**Find arc lengths and areas of sectors of circles**
G.C.B.4	Derive the formula for the length of an arc of a circle.
G.C.B.5	Derive the formula for the area of a sector of a circle.
Exploring Geometric Properties with Equations (GPE)	
G.GPE.A	**Translate between the geometric description and the equation for a conic section.**
G.GPE.A.1	Derive the equation of a circle.
G.GPE.A.2	Derive the equation of a parabola given a focus and directrix.
G.GPE.B	**Use coordinates to prove geometric theorems algebraically.**
G.GPE.B.3	Use coordinates to prove geometric theorems algebraically.
G.GPE.B.4	Prove the slope criteria for parallel and perpendicular lines and use them to solve problems.
G.GPE.B.5	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
G.GPE.B.6	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles.
Geometric Measurement and Dimension (GMD)	
G.GMD.A	**Explain volume formulas and use them to solve problems.**
G.MD.A.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid and cone.
G.MD.A.2	Use volume formulas for cylinders, pyramids, cones, spheres and composite figures to solve problems.
G.GMD.B	**Visualize relationships between two-dimensional and three-dimensional objects.**
G.MD.B.3	Identify the shapes of two-dimensional cross-sections of three-dimensional objects.
G.MD.B.4	Identify three-dimensional objects generated by transformations of two-dimensional objects.
Modeling with Geometry (MG)	
G.MG.A	**Apply geometric concepts in modeling situations.**
G.MG.A.1	Use geometric shapes, their measures and their properties to describe objects.
G.MG.A.2	Apply concepts of density based on area and volume in modeling situations.
G.MG.A.3	Apply geometric methods to solve design mathematical modeling problems.

Conditional Probability and Rules of Probability (CP)	
G.CP.A	**Understand independence and conditional probability and use them to interpret data.**
G.CP.A.1	Describe events as subsets of a sample space using characteristics of the outcomes, or as unions, intersections or complements of other events.
G.CP.A.2	Understand the definition of independent events and use it to solve problems.
G.CPA.3	Calculate conditional probabilities of events.
G.CPA.4	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.
G.CPA.5	Recognize and explain the concepts of conditional probability and independence in a context.
G.CPA.6	Apply and interpret the Addition Rule for calculating probabilities.
G.CPA.7	Apply and Interpret the general Multiplication Rule in a uniform probability model.
G.CPA.8	Use permutations and combinations to solve problems.