Course Description:

In this course, students build upon their understanding of geometric concepts by working through a variety of geometric problems, writing formal proofs in a coordinate plane, and constructing geometric figures. They apply the formulas for slope, midpoint, and distance in coordinate proofs. They also learn theorems about circles, find arc lengths and areas of sectors of circles, and write equations of circles in the coordinate system. For three-dimensional figures, students determine their volumes and cross sections. They also identify solids of revolution. Finally, students study probability.

Course Objectives:

- Write geometric proofs involving slope and properties of lines.
- Use coordinates to prove theorems and solve problems.
- Use formulas and theorems to derive equations and solve problems.
- Identify and describe relationships within circles.
- Calculate the volume of three-dimensional figures.
- Apply geometric models to describe objects and solve problems.
- Identify objects generated by rotations and shapes of cross-sections.
- Explain conditional probability and independence.
- Calculate and estimate probability using rules and two-way frequency tables.

Required Materials:

In course.

Course Overview:

Unit 1: Coordinate Geometry: Slope and Midpoints

In this unit, students work with parallel and perpendicular lines and write their equations using their slopes. They also use slope and midpoints in coordinate proofs. Finally, they learn how to partition line segments using ratios.

Unit 2: Coordinate Geometry: Distance Formula

In this unit, students use the Pythagorean Theorem and the distance formula to calculate distances in the coordinate plane. They work with circles and write their equations. Students also learn how to use the distance formula in proofs about parallelograms and circles. Finally, they derive the equation of a parabola from given information.

Unit 3: Circles: Line and Segment Relationships

In this unit, students work with tangent lines and segments, secant lines and segments, and chords. The use theorem about these elements of circles to to find unknown measures. Finally, students learn how to construct a circumscribed circle and an inscribed circle of a triangle.

Unit 4: Circles: Arc and Angle Relationships

In this unit, students learn why all circles are similar and how to use angle-arc relationships to solve problems. They also learn about the properties of angles and quadrilaterals that are inscribed inside a circle. Students find the length of an arc and the area of circle sectors.

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Unit 4 Activity Plan

Unit 5: Three-Dimensional Figures

In this unit, students solve problems related to the volume of cylinders, pyramids, cones, and spheres. They identify two-dimensional cross sections of three-dimensional objects and three-dimensional objects created by rotations of two-dimensional objects. Students also solve problems involving density.

Unit 6: Probability

In this unit, students solve problems that involve the probabilities of independent and dependent events, and the probabilities of mutually exclusive events and overlapping events. They learn how to calculate conditional probabilities using different ways.

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