Math

GEOMETRY

STANDARD 1

The student *understands and applies the concepts and procedures of number sense and numeration.*

To meet this standard, the student will:

Benchmark G.1.1: Compute fluently and make reasonable estimates

Indicators:

- G.1.1.1 Develop fluency in operations with real numbers using mental computation or paper and pencil calculations for simple cases and technology for more complicated cases
- G.1.1.2 Judge the reasonableness of numerical computations and their results
- G.1.1.3 Identify situations involving real numbers in which estimation is sufficient

Benchmark G.1.2: Apply appropriate operations to evaluate solutions

Indicators:

- G.1.2.1 Apply appropriate formulas to problems in two and three-dimensions
- G.1.2.2 Evaluate formulas for problems in two and three-dimensions
- G.1.2.3 Apply and evaluate operations using very large and very small numbers and various representations of them
- G.1.2.4 Apply the concept of ratio to similar figures and three-dimensional shapes

Benchmark G.1.3: Understand numbers, ways of representing numbers, and number systems

Indicator:

- G.1.3.1 Develop a deeper understanding of very large and very small numbers and various representations of them

Math

GEOMETRY

STANDARD 2
The student *understands and applies the concepts and procedures of algebra and patterns*.

To meet this standard, the student will:

Benchmark G.2.1: Translate verbal to mathematical expressions (and visa versa) and apply to real world problems

Indicators:

- G.2.1.1 Use algebraic modeling as a problem-solving strategy where appropriate
- G.2.1.2 Solve multi-step problems involving applications of percent, ratio, and rate as they arise

Benchmark G.2.2: Solve problems, using algebraic and geometric modeling

Indicators:

- G.2.2.1 Use algebraic modeling to solve formulaic equations involving area, surface area, and volume
- G.2.2.2 Use the relationships between slopes to determine if two lines are parallel or perpendicular and to write the equations for the lines
- G.2.2.3 Use the Pythagorean Theorem to establish types of triangles and length of missing sides
- G.2.2.4 Rearrange formulas involving variables in the first or second degree, with and without substitution, as they arise in topics throughout the course
- G.2.2.5 Use proportions to solve similar figure problems
- G.2.2.6 Simplify radical expressions
- G.2.2.7 Develop and apply the distance formula

Benchmark G.2.3: Specify locations and describe spatial relationships using coordinate geometry

Indicators:

- G.2.3.1 Transform figures in the coordinate plane and describe the transformation in algebraic terms
- G.2.3.2 Investigate conjectures and solve problems involving two- and three-dimensional objects represented with coordinates
- G.2.3.3 Describe and prove polygons using coordinate geometry

Math

GEOMETRY

STANDARD 3
The student *understands and applies the concepts and procedures of geometry*.

To meet this standard, the student will:

Benchmark G.3.1: Analyze characteristics and properties of two- and three-dimensional geometric shapes

Indicators:

- G.3.1.1 Analyze properties and determine attributes of two- and three-dimensional objects
- G.3.1.2 Identify and analyze relationships among two- and three-dimensional objects
- G.3.1.3 Solve problems involving relationships (including congruence and similarity) among classes of two- and three-dimensional objects (especially: triangles, special triangles, quadrilaterals, circles, parallel lines, bisectors, cones, pyramids, cylinders, spheres)
- G.3.1.4 Identify and apply properties of similar figures
- G.3.1.5 Recognize geometry in the world around us through various situations that God created

Benchmark G.3.2: Develop mathematical arguments about geometric relationships

Indicators:

- G.3.2.1 Identify the parts of logical argument (conditional, hypothesis, conclusion, converse, counterexamples, biconditionals, etc.) and use them to create logic chains and definitions
- G.3.2.2 Pose questions about geometric relationships, test them, and communicate the findings, using appropriate language and mathematical forms (e.g., written explanations, diagrams, formulas, tables)
- G.3.2.3 Make and test conjectures about relationships (including congruence and similarity) among classes of two- and three-dimensional objects
- G.3.2.4 Establish the validity of geometric conjectures using deduction, prove theorems, and critique arguments

Benchmark G.3.3: Apply transformations and use symmetry to analyze mathematical situations

Indicators:

- G.3.3.1 Understand and represent translations, reflections, rotations, and dilations of objects in the plane by using sketches, coordinates, and vectors
- G.3.3.2 Use various representations to help understand the effects of simple transformations and their compositions in mathematics and real world examples (like folding paper, Miras, compass construction, Geometry's Sketchpad, etc.)
- G.3.3.3 Apply reflectional and rotational symmetry

Benchmark G.3.4: Use visualization, spatial reasoning, and geometric modeling to solve problems

Indicators:

- G.3.4.1 Draw and construct representations of two- and three-dimensional geometric objects using a variety of tools (like compass construction, nets, dot paper, straws, blocks, Geometer's Sketchpad, etc.)
- G.3.4.2 Visualize three-dimensional objects from different perspectives and analyze their cross sections, (including nets)
- G.3.4.3 Develop and use formulas that apply to two- and three-dimensional figures
- G.3.4.4 Use geometric ideas to solve problems in, and gain insights into, other disciplines and other areas of interest such as art and architecture

Math

GEOMETRY

STANDARD 4
The student *understands and applies the concepts and procedures of measurement.*

To meet this standard, the student will:

Benchmark G.4.1: Understand measurable attributes of objects and the units, systems, and processes of measurement

Indicators:

G.4.1.1 Understand and use formulas to solve problems involving angles: sum of degrees in a polygon of a given number of sides

G.4.1.2 Judge the reasonableness of answers to measurement problems by considering likely results within the situation described in the problem considering accuracy and units

Benchmark G.4.2: Apply appropriate techniques and tools to determine measurements

Indicators:

G.4.2.1 Use Inductive reasoning and tools of construction (straight edge and compass) to reach conclusions regarding the characteristics, relationships, or applications of the constructed figures

G.4.2.2 Accurately construct figures using tools of construction

G.4.2.3 Use tools of measurement (ruler, protractor, compass) to classify and solve problems involving triangles, quadrilaterals, intersecting lines, and circles

Benchmark G.4.3: Solve problems involving the length, perimeter, area, surface area and volume of one, two, and three-dimensional objects respectively

Indicators:

G.4.3.1 Understand and use formulas to solve problems involving length: perimeter of figures, sides of a right triangle using the Pythagorean theorem, distance in the coordinate plane between two points, upper and lower bounds for the third side in a triangle when two sides are given

G.4.3.2 Understand and solve problems using the formulas for the surface area and the volume of prisms, pyramids, cylinders, cones, and spheres

Math

GEOMETRY

STANDARD 5
The student understands and applies the concepts and procedures of *data analysis and probability*.

To meet this standard, the student will:

Benchmark G.5.1: Determine relationships between two variables by collecting and analyzing data

Indicators:

G.5.1.1 Organize and analyze data, using appropriate techniques (e.g., making tables, graphs, and sketches, calculating measures of central tendency) and technology (e.g., graphing calculators, statistical software, spreadsheets)

G.5.1.2 Communicate the findings of an experiment clearly and concisely, using appropriate mathematical forms (e.g., written explanations, formulas, charts, tables, graphs), and justify the conclusions reached

G.5.1.3 Solve and/or pose problems related to an experiment, using the findings of the experiment

Benchmark G.5.2: Describe the connections between various representations of relations

Indicator:

G.5.2.1 Describe trends and relationships observed in data, make inferences from data, compare the inferences with hypotheses about the data, and explain the differences between the inferences and the hypotheses (Describe any trend observed in the data. Does a relationship seem to exist? Of what sort? Is the outcome consistent with your original hypothesis? Discuss any outlying pieces of data and provide explanations for them. Suggest a formula relating the situation. How might you vary this experiment to examine other relationships?)

Benchmark G.5.3: Apply rules of probability in geometric setting

Indicator:

G.5.3.1 Apply rules of probability in terms of area