

Mathematics Curriculum

Strand: I – Patterns, Relationships and Functions

Geometry

Standard	1. Students recognize similarities and generalize patterns, use patterns to create models and make predictions, describe the nature of patterns and relationships, and construct representations of mathematical relationships.
Benchmarks	<ul style="list-style-type: none">• Analyze and generalize geometric patterns.• Translate from tables to graphs, and from tables to making an interpretation of properties.• Study and employ mathematical pictures and models to make inferences and predictions.• Classify groups of shapes to understand and use their mathematical properties.• Use patterns and their structure to create a problem solving process. Use this process to discover new properties.
Sample Activity/Assessment tasks	<ul style="list-style-type: none">• Explore and create geometric patterns similar to those found in fractals like the Sierpinski carpet or Koch snowflake.• Construct a circle with 6 equally spaced points on it and draw the diagonals. Count the number of triangles formed. Does this agree with your rule?
Resources	

Mathematics Curriculum

Strand: I – Patterns, Relationships and Functions

Geometry

Standard	2. Students describe the relationships among variables, predict what will happen to one variable as another variable is changed, analyze natural variation and sources of variability, and compare patterns of change.
Benchmarks	<ul style="list-style-type: none">• Describe the rate of change in a line by the slope and the rate of size change in similar figures.• Use variables to solve problems involving the geometric properties.
Sample Activity/Assessment tasks	<ul style="list-style-type: none">• Change the perimeter of a Koch Snowflake from one stage to the next or change the area of the Sierpinski Triangle from one stage to the next.
Resources	

Mathematics Curriculum

Strand: II – Geometry and Measurement

Geometry

Standard	1. Students develop spatial sense, use shape as an analytic and descriptive tool, identify characteristics and define shapes, identify properties and describe relationships among shapes.
Benchmarks	<ul style="list-style-type: none">• Use shape to identify plane and solid figures.• Determine necessary and sufficient conditions for the existence of a particular shape and apply those conditions to analyze shapes.• Use transformations (rotation, reflections, or a combination) to prove generalizations about shapes. Use coordinate methods (such as slopes, and midpoints) to prove generalizations. Use synthetic (traditional deductive proofs) to prove generalizations.• Draw and construct shapes in two and three dimensions and justify the steps of their construction.• Study transformations of shapes using isometrics, size transformations and coordinate mapping.• Compare and analyze shapes and formally establish relationships of congruency, similarity, parallelism and perpendicularity.• Solve problems in the real world using shapes and shape properties.
Sample Activity/Assessment tasks	<ul style="list-style-type: none">• Draw tessellations. Make 3-dimensional shapes.
Resources	<ul style="list-style-type: none">• Rulers, protractors, compasses.• Models of three dimensional shapes and planes that intersect these models.

Mathematics Curriculum

Strand: II – Geometry and Measurement	Geometry
--	-----------------

Standard	2. Students identify locations of objects, identify location relative to other objects, and describe the effects of transformations on an object.
Benchmarks	<ul style="list-style-type: none"> • Locate and describe objects in terms of their position in 2-dimensional and 3-dimensional Cartesian coordinates. • Describe a location with respect to other parts of a shape such as median. Symmetry describes an object relative to itself. • Give precise mathematical descriptions of transformations and describe the effects of transformations on size, shape and position, and orientation. • Describe the position of a point or set of points by drawing, constructing, giving coordinate points, using algebraic rules (midpoint, slope, etc.) or verbally. A circle is a trace of the locus of a moving point equidistant from a point called the center. • Solve problems in the real world using the concept of position, direction, and orientation. Often it is necessary to select a coordinate system for making the mathematical model.
Sample Activity/Assessment tasks	<ul style="list-style-type: none"> • Cut clay solid figures with a thin ruler, which will show what happens when a plane cuts a solid. You can also use this for studying symmetry.
Resources	

Mathematics Curriculum

Strand: II – Geometry and Measurement

Geometry

Standard	3. Students compare attributes of two objects, or of one object with a standard, and analyze situations to determine what measurements should be made and to what level of precision.
Benchmarks	<ul style="list-style-type: none">• Select and use rulers and protractors to make accurate measurements using both metric and common units. Angles are measured in degrees.• Decide on an attribute of an object and classify it by the attribute of length, area, perimeter, volume or angle size.• Estimate measures of angles.• Introduce that changes in length of sides and angles affect other measurements such as angles in a polygon, area, perimeter and volume.• Study the indirect method for determining an area by using a grid. Use proportional methods for determining the length of sides in similar figures.• Solve real world problems, which involve measurement and geometric concepts.
Sample Activity/Assessment tasks	
Resources	

Mathematics Curriculum

Strand: III – Data Analysis and Statistics

Geometry

Standard	1. Students collect and explore data, organize data into a useful form, and develop skill in representing and reading data displayed in different formats.
Benchmarks	<ul style="list-style-type: none">• Collect and explore data through measurement.• Organize data using tables.• Represent data in tables.• Make generalizations about geometric shapes from data collected and displayed in tables.
Sample Activity/Assessment tasks	
Resources	

Mathematics Curriculum

Strand: III – Data Analysis and Statistics

Geometry

Standard	2. Students examine data and describe characteristics of a distribution, relate data to the situation from which they arose, and use data to answer questions convincingly and persuasively.
Benchmarks	<ul style="list-style-type: none">Solve problems regarding geometric shapes by measuring, making data tables and interpreting the results. (Ex. All angles of a triangle add up to 180°.)
Sample Activity/Assessment tasks	
Resources	

Mathematics Curriculum

Strand: III – Data Analysis and Statistics

Geometry

Standard	3. Students draw defensible inferences about unknown outcomes, make predictions, and identify the degree of confidence they have in their predictions.
Benchmarks	<ul style="list-style-type: none">• Employ investigations, pictures and models to make predictions to answer questions and solve problems.
Sample Activity/Assessment tasks	
Resources	

Mathematics Curriculum

Strand: IV – Number Sense and Numeration	Geometry
---	-----------------

Standard	<p>1. Students experience counting and measuring activities to develop intuitive sense about numbers, develop understanding about properties of numbers, understand the need for and existence of different sets of numbers, and investigate properties of special numbers.</p>
Benchmarks	<ul style="list-style-type: none"> • Develop an understanding of irrational numbers from use of the Pythagorean theorem, distance formulas and . • Develop an understanding of the properties of real numbers, especially reflective, symmetric and transitive. • Apply understanding of number systems to model and solve mathematical and applied problems.
Sample Activity/Assessment tasks	<ul style="list-style-type: none"> • Have students determine by measuring circles of different sizes and comparing the circumference to the diameter in a ratio.
Resources	

Mathematics Curriculum

Strand: IV – Number Sense and Numeration	Geometry
---	-----------------

Standard	2. Students recognize that numbers are used in different ways such as counting, measuring, ordering and estimating, understand and produce multiple representations of a number, and translate among equivalent representations.
Benchmarks	<ul style="list-style-type: none"> • Recognize that rational numbers have repeating or terminating decimal representations, whereas irrational numbers have non-repeating and non-terminating decimal representations. • Determine when to use rational approximations and the exact values of numbers, especially π. • Learn to apply estimation especially to check the reasonableness of solutions and calculator work. • Select the appropriate representation of π and irrational numbers when solving and simplifying problems.
Sample Activity/Assessment tasks	
Resources	<ul style="list-style-type: none"> • Banner representing 100 digits of π.

Mathematics Curriculum

Strand: IV – Number Sense and Numeration

Geometry

Standard	3. Students investigate relationships such as equality, inequality, inverses, factors and multiples, and represent and compare very large and very small numbers.
Benchmarks	<ul style="list-style-type: none">• Compare and order real numbers and compare rational approximations to exact values.• Express numerical comparisons as ratios in similar polygons and slope of lines.• Use radicals in work with Pythagorean theorem and the distance formula.• Apply the understanding of number relationships in solving problems.
Sample Activity/Assessment tasks	
Resources	

Mathematics Curriculum

Strand: V – Numerical and Algebraic Operations and Analytical Thinking Geometry

Standard	1. Students understand and use various types of operations to solve problems.
Benchmarks	<ul style="list-style-type: none">• Use geometric models and the knowledge of area and length to represent algebraic expressions.• Compute with real numbers.• Effectively and accurately solve problems with real numbers and algebraic expressions. Use the operations and properties to simplify the expressions.
Sample Activity/Assessment tasks	<ul style="list-style-type: none">• Use a sketch or a graph to convince someone that the expression $(x + 3)^2$ is not equivalent to $x^2 + 9$. This can be done using area.
Resources	

Mathematics Curriculum

Strand: V – Numerical and Algebraic Operations and Analytical Thinking Geometry

Standard	2. Students analyze problems to determine an appropriate process for solution, and use algebraic notations to model or represent problems.
Benchmarks	<ul style="list-style-type: none">• Identify angles measure or the length of sides in a context. Symbolize them and express their relationships algebraically.• Solve linear equations and inequalities.• Use a model to identify and select features of a real world situation. Represent these features symbolically and solve the problem. Use appropriate unit labels to communicate the meaning of the answers.• Explore problems that reflect the contemporary uses of geometry in significant context.
Sample Activity/Assessment tasks	
Resources	

Mathematics Curriculum

Strand: VI – Probability and Discrete Mathematics

Geometry

Standard	1. Students develop an understanding of the notion of certainty and of probability as a measure of the degree of likelihood that can be assigned to a given event based on the knowledge available, and make critical judgments about claims that are made in probabilistic situations.
Benchmarks	<ul style="list-style-type: none">• Begin to develop some idea of chance and probability as it relates to geometric regions.
Sample Activity/Assessment tasks	<ul style="list-style-type: none">• Use targets and spinners to compare areas of parts and the whole. These comparisons set up as a ratio describe probability of the dart hitting the bull's eye or the arrow of a spinner landing in a certain segment.
Resources	

Mathematics Curriculum

Strand: VI – Probability and Discrete Mathematics

Geometry

Standard	2. Students investigate practical situations such as scheduling, routing, sequencing, networking, organizing and classifying, and analyze ideas like recurrence relations, induction, iteration, and algorithm design.
Benchmarks	<ul style="list-style-type: none">• Use set notation to classify and arrange geometric figures.• Use network graphing to understand circuits and possible paths.• Describe and analyze step-by-step processes for accomplishing a task. Proofs would be one way this is accomplished.• Use the ideas of probability, (comparisons of areas) and network geometry to solve problems.
Sample Activity/Assessment tasks	
Resources	