

Unit Title: “Covering and Surrounding”

Course: Middle School Mathematics

Subject Area: Mathematics

Time Frame: 20 days

Standards

Middle School Mathematics Standards	Sunshine State Standards Benchmarks	NCEE New Standards
<p>The student will:</p> <p>5.1 Find areas and perimeters of rectangular shapes and non-rectangular shapes.</p> <p>5.2 Develop procedures for finding areas and perimeters of rectangles, parallelograms, triangles, and circles.</p> <p>5.3 Use area and perimeter to solve applied problems.</p> <p>5.4 Find perimeters and areas of non-rectangular figures by ‘covering’ the figures with grids, tiles, or other objects and ‘surrounding’ the figures with string, straight-line segments, or other objects.</p> <p>5.5 Reason about spatial relationships.</p> <p>5.6 Use models and representations of models to solve problems.</p>	<p>MA.B.1.3.1 The student uses concrete and graphic models to derive formulas for finding perimeter, area, surface area, circumference, and volume of two- and three-dimensional shapes, including rectangular solids and cylinders.</p> <p><i>Expectations</i> The student</p> <ul style="list-style-type: none">• Uses concrete or graphic models to create formulas for finding perimeter and area.• Uses concrete and graphic models to discover an approximation for π and create a formula for finding circumference. <p>MA.B.1.3.3 The student understands and describes how the change of a figure in such dimensions as length, width, height, or radius affects its other measurements such as perimeter, area, surface area, and volume.</p>	<p>The student:</p> <p>M2a Is familiar with assorted two- and three-dimensional objects, including squares, triangles, other polygons, circles, cubes, rectangular prisms, pyramids, spheres, and cylinders.</p> <p>M2d Determines and understands length, area, and volume, including perimeter and surface area; uses units, square units, and cubic units of measure correctly; computes areas of rectangles, triangles, and circles; computes volumes of prisms.</p> <p>M2g Measures angles, weights, capacities, times, and temperatures using appropriate units.</p> <p>M2h Choose appropriate units of measure and converts with ease between like units.</p>

Middle School Mathematics Standards	Sunshine State Standards Benchmarks	NCEE New Standards
	<p><i>Expectations</i> The student:</p> <ul style="list-style-type: none"> • Given a two-dimensional figure, creates a new figure by increasing or decreasing the original dimensions. • Knows the relationship between the area or perimeter of an original figure and that of a newly created figure. • Solves real-world or mathematical problems involving perimeter or area and how these are affected by changes in the dimensions of the figures. <p>MA.B.1.3.4 The student constructs, interprets, and uses scale drawing such as those based on number lines and maps to solve real-world problems.</p> <p><i>Expectations</i> The student:</p> <ul style="list-style-type: none"> • Knows proportional relationships in scale drawings. • Uses scale drawings to solve real-world problems including distance (as in map reading). <p>MA.B.2.3.1 The student uses direct (measured) and indirect (not measured) measures to compare a given characteristic in either metric or customary units.</p>	<p>M2j Reasons proportionally with measurements to interpret maps and to make smaller and larger scale drawings.</p> <p>M2k Models situations geometrically to formulate and solve problems.</p> <p>M6c Estimates numerically and spatially.</p>

Middle School Mathematics Standards	Sunshine State Standards Benchmarks	NCEE New Standards
	<p><i>Expectations</i> The student:</p> <ul style="list-style-type: none"> • Compares objects according to their length, weight or mass, and capacity using customary or metric units. • Measures length, weight or mass, and capacity using appropriate measuring instruments. <p>MA.B.2.3.2 The student solves problems involving units of measure and converts answers to a larger or smaller unit within either the metric or customary system.</p> <p><i>Expectations</i> The student:</p> <ul style="list-style-type: none"> • Changes one customary or metric unit of measurement to another within the same system. • Uses concrete manipulatives or constructs models of square units for measuring area and cubic units for measuring volume. <p>MA.B.3.3.1 The student solves real-world and mathematical problems involving estimates of measurements including length, time, weight/mass, temperature, money, perimeter, area, and volume, in either customary or metric units.</p>	

Middle School Mathematics Standards	Sunshine State Standards Benchmarks	NCEE New Standards
	<p><i>Expectations</i> The student:</p> <ul style="list-style-type: none"> • Estimates the measure (length, weight or mass, and capacity) of an object or figure and then compares the estimate with the actual measurement of the object or figure. • Knows whether an exact answer is needed or an estimate is sufficient. • Estimates solutions to real-world problems by estimating the length, volume or capacity, weight or mass, perimeter, or area of objects or shapes in either customary or metric units. • Estimates solutions to real-world problems involving measurement, including estimates of time, temperature, and money. <p>MA.B.4.3.1 The student selects appropriate units of measurement and determines and applies significant digits in a real-world context.</p> <p><i>Expectations</i> The student:</p> <ul style="list-style-type: none"> • Selects the appropriate unit of measure for a given real-world situation. • Knows the approximate nature of measurement and measure to the specified degree of accuracy. 	

Middle School Mathematics Standards	Sunshine State Standards Benchmarks	NCEE New Standards
	<p data-bbox="772 306 905 331">Ma.B.4.3.2</p> <p data-bbox="772 337 1276 483">The student selects and uses appropriate instruments, technology and techniques to measure quantities in order to achieve specified degrees of accuracy in a problem situation.</p> <p data-bbox="772 521 926 545"><i>Expectations</i></p> <p data-bbox="772 552 919 576">The student:</p> <ul data-bbox="772 583 1318 764" style="list-style-type: none"> <li data-bbox="772 583 1318 607">• Selects an appropriate measurement tool. <li data-bbox="772 613 1276 703">• Determines the interval of a scale and reads the scales on a variety of measuring instruments. <li data-bbox="772 709 1171 764">• Measures accurately with the measurement tools. 	

Desired Results

Enduring Understanding	Essential Questions	Knowledge and Skills
<p>Student will understand</p> <ul style="list-style-type: none"> • Area may be interpreted as the number of square units needed to cover a two-dimensional shape. • Perimeter may be interpreted as the number of linear units needed to surround a two-dimensional shape. 	<ul style="list-style-type: none"> • What properties of square tiles and rectangular tiles make them so useful for covering flat surfaces? • How are perimeter and area of a figure related? • How can we find the perimeter of an irregular figure? How can we find the area? • Can a figure have a small area but a large perimeter? Can a figure have a large area abut a small perimeter? • Are there special relationships between perimeter and area for 4-sided figures such as parallelograms? • Is there a relationship between perimeter and area for triangles? • Does a circle have perimeter and area? If so, how can they be found? 	<p>Students will know</p> <ul style="list-style-type: none"> • Key terms (e.g., area, center (of a circle), circumference, diameter, perimeter, radius (radii), π or π). • The area of a triangle and the area of a parallelogram are related to the area of a rectangle. <p>Students will be able to</p> <ul style="list-style-type: none"> • Find relationships between perimeter and area. • Develop strategies for finding areas and perimeters of rectangular shapes and nonrectangular shapes. • State in words or symbols the procedures for finding areas and perimeters of rectangles, parallelogram, triangles, and circles. • Use area and perimeter to solve applied problems. • Devise strategies for finding areas by cutting and rearranging figures.

Acceptable Evidence

Performance Tasks	Quizzes, Test, and Work Samples	Observations and Dialogues
<ul style="list-style-type: none"> • Measuring Perimeter and area Students build a good understanding of the difference between perimeter and area by dealing with the concepts concurrently in a concrete, manipulative setting. They use square tiles to create designs to cover pictures of designs to find areas and perimeters, and they transform designs to fit a prescribed perimeter or area. • Measuring Odd Shapes Students consider the measuring of thing with curved or irregular edges that can't be laid along a ruler. This calls for using other tools, such as string, to help find an approximation. They trace their feet on grid paper, estimate the perimeters and areas of the tracings, and discuss how these measurements might be helpful to the manufacturers. • Constant Area, Changing Perimeter A classic maxima/minima problem, asking students to find the largest and the smallest perimeter for a given area. Students construct tables to help highlight and reveal patterns in data. • Constant Perimeter, Changing Area Maxima/minima questions where the perimeter is fixed and area is allowed to change. Students confront the misconception that determines perimeter and vice versa. • Measuring Parallelograms Students cut and rearrange parallelograms to make rectangles and develop strategies for using what they know about finding the area of a rectangle to find the area of a parallelogram. • Measuring Triangles Students are introduced to finding areas and perimeters of triangles by using grids, arranging triangles to form parallelograms, and measuring with rulers. Special triangles – such as isosceles and 30-60-90 triangles – are explored. • Going Around in Circles Questions are asked to help students see that the 	<p>Check-Up 1 Quiz A Check-Up 2 Quiz B Unit Test Unit Project – Plan a Park</p>	<p>Teacher observations of students during work on performance tasks. Accountable talk during work on performance tasks.</p>

Performance Tasks	Quizzes, Test, and Work Samples	Observations and Dialogues
<p>circumference of a circle is slightly more than three times its diameter, and that a circle's area is slightly more than three times the area of a square whose edges are equal to the circle's radius. These discoveries lead students to the idea of the value of pi.</p>		