

Unit Title: "The Kitchen floor: Area and Subproblems"

Course: Algebra I (High School)

Subject Area: Mathematics

Time Frame: 14 days

Standards

Algebra I Standards	Sunshine State Standards Benchmarks	NCEE New Standards
<p>The student will:</p> <p>1.1 Simplify expressions with and without grouping symbols.</p> <p>3.3 Use the distributive property to combine similar terms.</p> <p><i>Review:</i> M/J mathematics 1</p> <p>The student will:</p> <p>5.1 Find area 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 perimeters to solve applied problems.</p>	<p>MA.A.3.4.2 The student will select alternative strategies, such as using properties of numbers, including inverse, identity, distributive, associative, and transitive, that allow operational shortcuts for computational procedures in real-world or mathematical problems.</p> <p>MA.B.1.4.1 The student will use 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, cylinders, cones and pyramids.</p> <p>MA.B.1.4.3 The student will relate the concepts of measurement to similarity and proportionality in real-world situations.</p>	<p>The student:</p> <p>M1a Consistently and accurately adds, subtracts, multiplies, and divides rational numbers using methods and raises rational number to whole number powers.</p> <p>M6a Computes accurately with arithmetic operations on rational numbers.</p> <p>M6b Knows and uses the correct order of operations for arithmetic computations.</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>M2k Models situations geometrically to formulate and solve problems.</p> <p>M6d Measures length, area, volume, weight, time, and temperature accurately.</p>

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	<p data-bbox="772 337 1241 456">MA.A.2.4.1 The student will select and use direct (measured) and indirect (not measured) methods of measurement s appropriate.</p> <p data-bbox="772 521 1310 727">MA.B.3.4.1 The student will solve real-world and mathematical problems involving estimates of measurements, including length time, weight/mass, temperature, money, perimeter, are, and volume and estimate the effects of measurement errors on calculations.</p> <p data-bbox="772 824 1318 1031">MA.C.2.4.1 The student will understand the geometric concepts such as perpendicularity, parallelism, <i>tangency</i>, congruency, similarity, reflections, symmetry, <i>and transformations including flips, slides, turns, enlargements, rotations, and fractals.</i></p> <p data-bbox="772 1096 1325 1279">MA.C.3.4.1 The student will represent and apply geometric properties and relationships to solve real-world and mathematical problems including ratio, proportion, <i>and properties of right triangle trigonometry.</i></p>	

Desired Results

Enduring Understanding	Essential Questions	Knowledge and Skills
<p>Students will understand:</p> <ul style="list-style-type: none"> • Breaking larger problems into more manageable parts is a useful problem solving strategy. • The measurement process involves several key elements: <ul style="list-style-type: none"> ○ A phenomenon or object is chosen, and an attribute that can be measured is identified. ○ An appropriate unit is selected. ○ The unit is used repeatedly to “match” the attribute of the phenomenon or object in an appropriate way. ○ The number of units is determined. 	<ul style="list-style-type: none"> • What rules govern the way expressions are evaluated? • Is there more than one way to evaluate an expression? • How can the distributive property be applied to solve problems? • What properties of square tiles and rectangular tiles make them so useful for covering flat surfaces? • How are the perimeter and area of a figure related? • How can we find the area of an irregular figure? • 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), circle, circumference, diameter, perimeter, radius (radii) π or π, base, height, length, width, perpendicular, trapezoid, distributive property). <p>Students will be able to</p> <ul style="list-style-type: none"> • Simplify expressions with and without grouping symbols. • Find perimeters and areas for rectangles, parallelograms, trapezoids, and circles. • Break larger problems into more manageable parts.

Acceptable Evidence

Performance Tasks	Quizzes, Test, and Work Samples	Observations and Dialogues
<ul style="list-style-type: none"> • The Paint Job The Paint Job is an opening task to focus students' attention to breaking larger problems into manageable parts. Regardless of whether study teams ultimately get the correct solution, they will be forced to break this problem down into smaller pieces, 	Check-Up 1 Quiz A Check-Up 2 Quiz B Unit Test	Teacher observations of students during work on performance tasks. Accountable talk during work on performance tasks.

or “subproblems,” even if they are not yet aware of what a subproblem is.

- **Area of Triangle Investigations**

Students use dot paper and Geometer’s SketchPad to investigate the how the areas of triangles may be related to the areas of rectangles.

- **Circumference of Circles**

Students complete table of values for measurement of circumferences and diameters of circular objects to calculate the value for $\frac{\text{circumference}}{\text{diamter}}$.

- **Area of Circles**

Students cut given circle in half and then divide each semicircle into sectors leaving the outer edges connected. The “teeth” of the semicircles are fitted together to form a rectangle. The formula for the area of circles may be developed by determining the base of the shape ($\frac{1}{2}$ of the circumference, or πr^2) and the height of the shape (the radius of the circle).

- **Multiplying with Algebra Tiles**

Students consider the multiplication of polynomials as subproblems of finding areas for various rectangles.