Math Background

Properties of Quadrilaterals

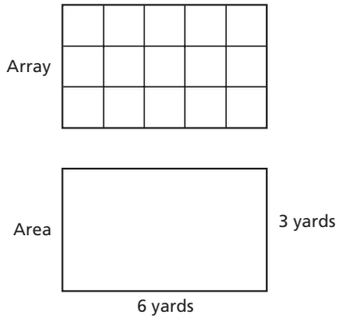
In Unit A, students explore the attributes of quadrilaterals in a mathematical way. They learn to use specialized vocabulary for the line segments that make up each quadrilateral, e.g. *parallel*, *perpendicular*, *opposite*, and *adjacent*, and they discover properties such as *congruence* and *symmetry*. They also gain an understanding of the classification of the various quadrilaterals. (For example, squares are special kinds of rectangles, which are special kinds of parallelograms.)

This basic knowledge about quadrilaterals lays the conceptual foundation for simple formula development. If students know that the opposite sides of a parallelogram or rectangle are equal, for example, they can simplify the perimeter formula ($l + w + l + w$) to ($l \times 2$) + ($w \times 2$). They can also develop a formula for area, knowing that we only need two measurements (length and width) and not all four.

Area and Multiplication Practice

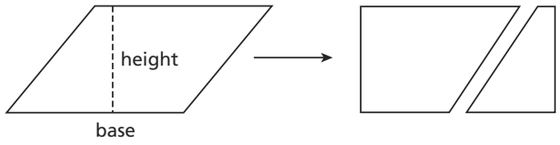
In *Math Expressions*, the geometry mini-units that follow each regular unit facilitate connections and enable students to review what they have recently learned. In this mini-unit, students use the multiplication and division skills they learned in Unit 1 to find the area of rectangles. In turn, their knowledge of area will prepare them to use rectangular area models for multi-digit multiplication in later units.

As students work with the area of rectangles in Unit A, links are drawn between arrays, which they already know, and area.



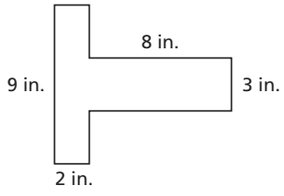
Rearranging Shapes

After this fundamental work with the area and perimeter of rectangles, students will develop strategies for finding the area and perimeter of other shapes. For example, students discover that a parallelogram can be cut and reassembled as a rectangle.



Its area is therefore found by multiplying the length of the *base* times the *height*, which is the same as the width of the corresponding rectangle.

Complex shapes can be understood by applying what we already know about quadrilaterals to find the unknown dimensions. In the figure shown here, we can find the missing dimensions because we know that the opposite sides of the embedded rectangles are equal.



In Unit B, students will use similar strategies to deconstruct rectangles and parallelograms into triangles.