Area Model

This area model of unit squares is the building block for area models that will extend to rational numbers and polynomial expressions. It highlights the relationship between the length, 7 units, and the width, 3 units. The area model represents the product of 3 and 7.

The length of an area model represents one factor. Its width represents a second factor. The area represents the product of these two factors.

This area model represents a general view of the product of 16 and 24 as represented by base-ten blocks. The values of the blocks are recorded within each section of the area model. The product of 16 and 24 can be determined by adding together each of the areas of the smaller rectangles forming the area model.

An area model can also be used to represent multiplication when one factor is decomposed into smaller components to help with mental math. In this case, the length of 17 units is decomposed into 10, 5, and 2. 10, 5, and 2 represent easily recalled facts. So, the area of each smaller section can be combined to determine the value of the product of 9 and 17.

This area model represents the decomposition of the measures of the length and the width based on place value.

An area model can also be used to determine quotients by decomposing the quotient into a sum of values whose addends are each divisible by the divisor. In this example, the divisor is represented by the width of the area model. The quotient is represented by the entire area of the area model. The dividend is represented by the length of the area model which, for this example, is 124.

Area models can be adapted for use with decimal multiplication in much the same way that they are used for whole number multiplication. Each factor represents a dimension of the area model.

Area models can be adapted for use with fraction multiplication in much the same way that they are used for whole number multiplication. Each factor represents a dimension of the area model

The dimensions of the area model may be rational numbers in decimal or fraction form. In these examples, the overlapping regions represent the area model for the product of the given two factors.

An area model may be used to represent the multiplication of a constant and a trinomial. The dimensions of the rectangle are 6 and the quantity 8x squared minus 2x plus 14. The area model is comprised of three smaller rectangles of dimensions 6 and 8x squared, 6 and -2x, and 6 and 14.

An area model may be used to represent the multiplication of two binomials. The length of this second area model is the quantity 2x minus 3. The width is 5x plus 7. In determining the area of each smaller rectangle, one can determine the area of the entire model by adding together the expressions that represent each smaller area. These smaller areas may be added as they represent non-overlapping, continuous sections of the area model.