

# Geometry Through Art

## Some Notes for Session On SQUARES

### Square Numbers and Measurement of Area:

Measurement begins with counting. There are two kinds of measurements in which the square and its properties should be explored with young children. The square is useful in measuring perimeters and areas. From ancient times to modern times, perimeter and area are measured in grid units of squares. (See Figure 1.)

A useful procedure in establishing the concept of square numbers is to distribute graph paper (a grid with very small squares) and ask children to color in a "one-square square", i.e., the smallest square that can be found on the grid. Then inspect to see what the students did. Show the class a correctly colored on-square square made by a classmate. "How many squares should we color in to make a bigger square? One that is the next size." (See Figure 2.) Students may color in 4, in 9 or more squares. Some shapes will be square, some rectangles, some irregular. The class will explore the numbers of squares one colors in to make bigger and bigger squares, and the class leader will list them in size order on the blackboard:

1st. Square-square = 1
2nd square-square = 4
3rd square-square = 9
4th square-square = 16

Students are asked to look for a pattern. What is the secret of the square numbers? Who can predict a number that will color in to make a square?

What numbers will make rectangles?

What numbers will not make rectangles or squares?

What do we call such numbers? (Prime Numbers)

With the above activity as a foundation, it is then an easy matter to develop the concepts of perimeter and area for rectangles and squares. One deals in counting squares along the sides, the other of multiplying length and width.

When one knows that the square is divided by diagonal lines into equal halves, it is then easier to visualize the formula for the area of the triangle in units of squares. The formula for the area of a triangle is base  $\times$   $1/2$  the altitude. If one counts up the area of a rectangle or square, then divides it along the diagonal, one obtains  $1/2$  the area of the rectangle.

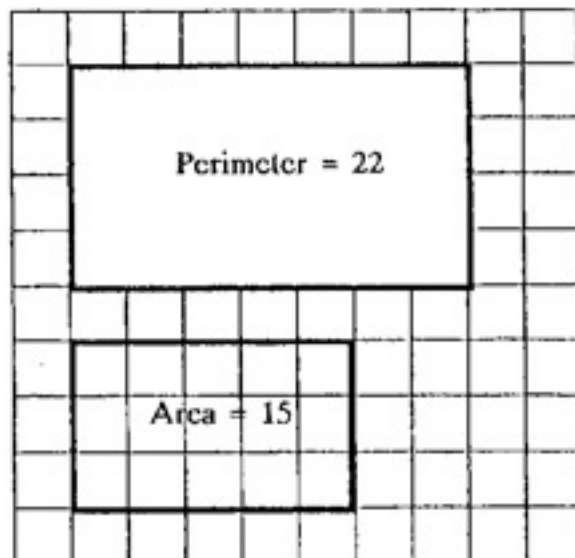


Figure 1.

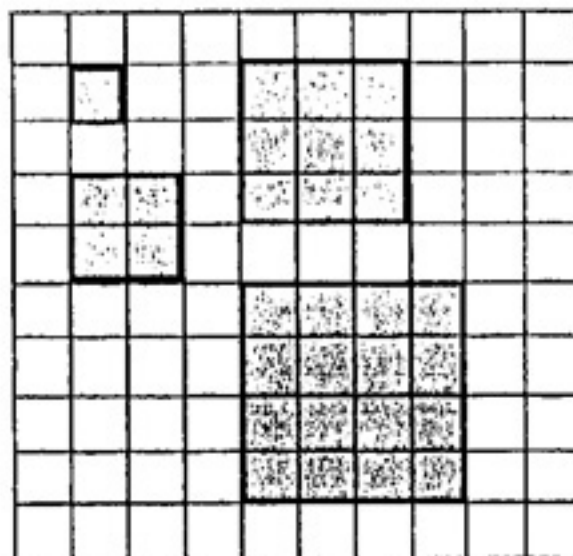


Figure 2.