

Activity 4

OBJECTIVE

To obtain the solution of a quadratic equation ($x^2 + 4x = 60$) by completing the square geometrically.

MATERIAL REQUIRED

Hardboard, glazed papers, adhesive, scissors, marker, white chart paper.

METHOD OF CONSTRUCTION

1. Take a hardboard of a convenient size and paste a white chart paper on it.
2. Draw a square of side of length x units, on a pink glazed paper and paste it on the hardboard [see Fig. 1]. Divide it into 36 unit squares with a marker.
3. Alongwith each side of the square (outside) paste rectangles of green glazed paper of dimensions $x \times 1$, i.e., 6×1 and divide each of them into unit squares with the help of a marker [see Fig. 1].
4. Draw 4 squares each of side 1 unit on a yellow glazed paper, cut them out and paste each unit square on each corner as shown in Fig. 1.

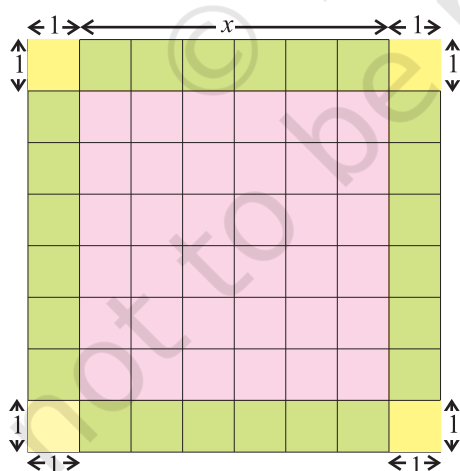


Fig. 1

$$x^2 + 4x + 4 = 64$$

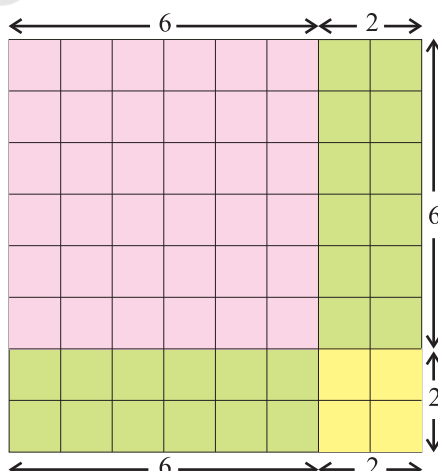


Fig. 2

5. Draw another square of dimensions 8×8 and arrange the above 64 unit squares as shown in Fig. 2.

DEMONSTRATION

1. The first square represents total area $x^2 + 4x + 4$.
2. The second square represents a total of 64 ($60 + 4$) unit squares.

Thus, $x^2 + 4x + 4 = 64$

or $(x + 2)^2 = (8)^2$ or $(x + 2) = \pm 8$

i.e., $x = 6$ or $x = -10$

Since x represents the length of the square, we cannot take $x = -10$ in this case, though it is also a solution.

OBSERVATION

Take various quadratic equations and make the squares as described above, solve them and obtain the solution(s).

APPLICATION

Quadratic equations are useful in understanding parabolic paths of projectiles projected in the space in any direction.