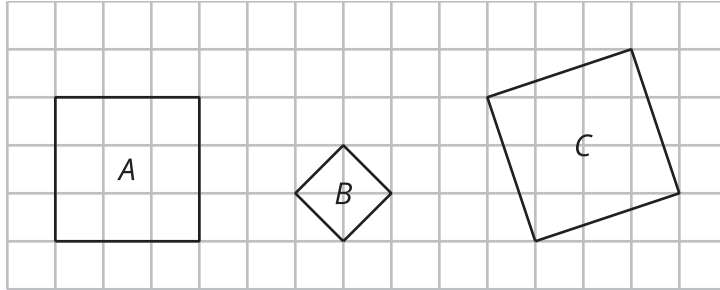


# Unit 7 Lesson 15: Quadratic Equations with Irrational Solutions

## 1 Roots of Squares (Warm up)

### Student Task Statement

Here are some squares whose vertices are on a grid.



Find the area and the side length of each square.

square	area (square units)	side length (units)
A		
B		
C		

## 2 Solutions Written as Square Roots

### Student Task Statement

Solve each equation. Use the  $\pm$  notation when appropriate.

1.  $x^2 - 13 = -12$

2.  $(x - 6)^2 = 0$

3.  $x^2 + 9 = 0$

4.  $x^2 = 18$

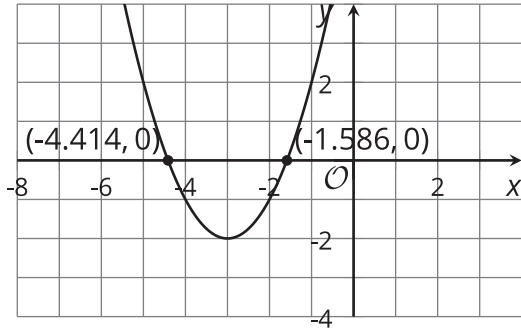
5.  $x^2 + 1 = 18$

6.  $(x + 1)^2 = 18$

### 3 Finding Irrational Solutions by Completing the Square

#### Student Task Statement

Here is an example of an equation being solved by graphing and by completing the square.



$$\begin{aligned}x^2 + 6x + 7 &= 0 \\x^2 + 6x + 9 &= 2 \\(x + 3)^2 &= 2 \\x + 3 &= \pm\sqrt{2} \\x &= -3 \pm \sqrt{2}\end{aligned}$$

Verify:  $\sqrt{2}$  is approximately 1.414.

So  $-3 + \sqrt{2} \approx -1.586$  and  $-3 - \sqrt{2} \approx -4.414$ .

For each equation, find the exact solutions by completing the square and the approximate solutions by graphing. Then, verify that the solutions found using the two methods are close. If you get stuck, study the example.

1.  $x^2 + 4x + 1 = 0$

2.  $x^2 - 10x + 18 = 0$

3.  $x^2 + 5x + \frac{1}{4} = 0$

4.  $x^2 + \frac{8}{3}x + \frac{14}{9} = 0$