

Lesson 10-8 (pp. 554-558)

Using the Discriminant

Lesson Objective ▼ Find the number of solutions of a quadratic equation	NAEP 2005 Strand: Algebra Topic: Equations and Inequalities Local Standards:
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Vocabulary and Key Concepts

Property of the Discriminant

For the quadratic equation $ax^2 + bx + c = 0$, where $a \neq 0$, you can use the value of the discriminant to determine the number of solutions.

If $b^2 - 4ac > 0$, there are two solutions.

If $b^2 - 4ac = 0$, there is one solution.

If $b^2 - 4ac < 0$, there are no solutions.

The discriminant is $b^2 - 4ac$; the expression under the radical sign in the quadratic formula

Example

- 1 **Using the Discriminant** Find the number of solutions of $x^2 = -3x - 7$ using the discriminant.

$$x^2 + 3x + 7 = 0$$

$$\begin{aligned} b^2 - 4ac &= (3)^2 - 4(1)(7) \\ &= 9 - 28 \\ &= -19 \end{aligned}$$

Since $-19 < 0$, the equation has no solution.

Write in standard form.

Evaluate the discriminant. Substitute for a , b , and c .

Use the order of operations.

Simplify.

Check Understanding

1. Find the number of solutions for each equation.

a. $x^2 = 2x - 3$

$$\begin{aligned} 0 &= -x^2 + 2x - 3 \\ a &= -1 \quad b = 2 \quad c = -3 \\ b^2 - 4ac & \\ 4 - 4 \cdot (-1) \cdot (-3) & \\ -8 & \end{aligned}$$

no solutions

b. $3x^2 - 4x = 7$

$$\begin{aligned} 3x^2 - 4x - 7 &= 0 \\ a &= 3 \quad b = -4 \quad c = -7 \\ b^2 - 4ac & \\ 16 - 4 \cdot 3 \cdot (-7) & \\ 100 & \end{aligned}$$

two solutions

c. $5x^2 + 8 = 2x$

$$\begin{aligned} 5x^2 - 2x + 8 &= 0 \\ a &= 5 \quad b = -2 \quad c = 8 \\ b^2 - 4ac & \\ 4 - 4 \cdot 5 \cdot 8 & \\ -156 & \end{aligned}$$

no solutions