Local Standards:

Name Class_ Date_

Lesson 10-7

Using the Discriminant

Lesson Objective

V Find the number of solutions of a quadratic equation

NAEP 2005 Strand: Algebra Topic: Equations and Inequalities

Vocabulary and Key Concepts

Property of the Discriminant

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

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

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

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

-4ac → under

Example

1 Using the Discriminant Find the number of solutions of $x^2 = -3x - 7$ using the 43x +7 discriminant.

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

Write in standard form.

Evaluate the discriminant. Substitute for a, b, and c. Use the order of operations.

Simplify.

Since -19 < 0, the equation has solution.

Quick Check

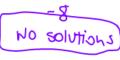
a=3

1. Find the number of solutions for each equation. **a.** $x^2 = 2x - 3$ **b.** $3x^2 - 4x =$

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

Algebra 1 Lesson 10-7

Daily Notetaking Guide



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Example

2 Applying the Discriminant A football is kicked from a starting height of 3 ft with an initial upward velocity of 40 ft/s. Will the football ever reach a height of 30 ft? Use the vertical motion formula $h = -16t^2 + vt + c$, where h = 30, v = velocity, c = starting height, and t = time to land.

$$h = -16t^2 + vt + c$$
Use the vertical motion formula.
$$0 = -16t^2 + 40t - 27$$
Use the vertical motion formula.
Substitute 30 for t , 40 for t , and 5 for t .
Write in standard form.

$$b^2 - 4ac = (40)^2 - 4(-16)(-77)$$
 Evaluate the discriminant. $b = -16$ $b = -178$ Use the order of operations. $b = -178$ Simplify. $b = -178$

The discriminant is negative. The football which reach a height of 30 ft.

Quick Check

2. A construction worker on the ground tosses an apple to a fellow worker who is 20 ft above the ground. The starting height of the apple is 5 ft with an initial upward velocity of 32 ft/s. Will the apple reach the worker? Use the vertical motion formula.

$$20 = -16t^{2} + 32t + 5$$

$$-20$$

$$0 = -16t^{2} + 32t - 15$$

$$32^{2} - 4(-16)(-15)$$

$$1,024 - 960$$

$$64$$

$$485$$