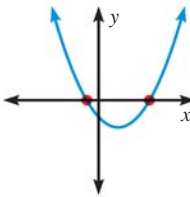
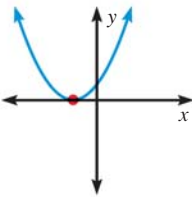
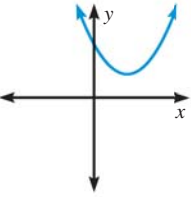


DISCRIMINANT In the quadratic formula, the expression $b^2 - 4ac$ is called the **discriminant** of the associated equation $ax^2 + bx + c = 0$.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad \leftarrow \text{discriminant}$$

You can use the discriminant of a quadratic equation to determine the equation's number and type of solutions.

KEY CONCEPT		<i>For Your Notebook</i>		
Using the Discriminant of $ax^2 + bx + c = 0$				
Value of discriminant	$b^2 - 4ac > 0$	$b^2 - 4ac = 0$	$b^2 - 4ac < 0$	
Number and type of solutions	Two real solutions	One real solution	Two imaginary solutions	
Graph of $y = ax^2 + bx + c$	 Two x-intercepts	 One x-intercept	 No x-intercept	

EXAMPLE 4 Use the discriminant

Find the discriminant of the quadratic equation and give the number and type of solutions of the equation.

a. $x^2 - 8x + 17 = 0$

b. $x^2 - 8x + 16 = 0$

c. $x^2 - 8x + 15 = 0$

Solution

Equation	Discriminant	Solution(s)
$ax^2 + bx + c = 0$	$b^2 - 4ac$	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
a. $x^2 - 8x + 17 = 0$	$(-8)^2 - 4(1)(17) = -4$	Two imaginary: $4 \pm i$
b. $x^2 - 8x + 16 = 0$	$(-8)^2 - 4(1)(16) = 0$	One real: 4
c. $x^2 - 8x + 15 = 0$	$(-8)^2 - 4(1)(15) = 4$	Two real: 3, 5

✓ GUIDED PRACTICE for Example 4

Find the discriminant of the quadratic equation and give the number and type of solutions of the equation.

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

5. $3x^2 + 12x + 12 = 0$

6. $8x^2 = 9x - 11$

7. $7x^2 - 2x = 5$

8. $4x^2 + 3x + 12 = 3 - 3x$

9. $3x - 5x^2 + 1 = 6 - 7x$