10.7 Interpret the Discriminant

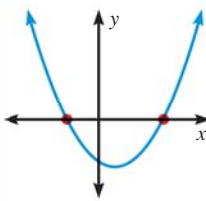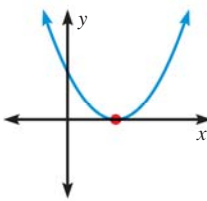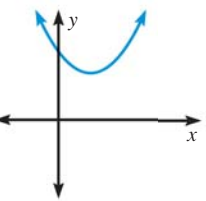|	
Before	You used the quadratic formula.
Now	You will use the value of the discriminant.
Why?	So you can solve a problem about gymnastics, as in Ex. 49.

Key Vocabulary
• discriminant

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

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

Because the discriminant is under the radical symbol, the value of the discriminant can be used to determine the number of solutions of a quadratic equation and the number of x-intercepts of the graph of the related function.

KEY CONCEPT   *For Your Notebook*

Using the Discriminant of $ax^2 + bx + c = 0$

READING
Recall that in this course, *solutions* refers to real-number solutions.

Value of the discriminant	$b^2 - 4ac > 0$	$b^2 - 4ac = 0$	$b^2 - 4ac < 0$
Number of solutions	Two solutions	One solution	No solution
Graph of $y = ax^2 + bx + c$	Two x-intercepts	One x-intercept	No x-intercept

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EXAMPLE 1   Use the discriminant

Equation $ax^2 + bx + c = 0$	Discriminant $b^2 - 4ac$	Number of solutions
a. $2x^2 + 6x + 5 = 0$	$6^2 - 4(2)(5) = -4$	No solution
b. $x^2 - 7 = 0$	$0^2 - 4(1)(-7) = 28$	Two solutions
c. $4x^2 - 12x + 9 = 0$	$(-12)^2 - 4(4)(9) = 0$	One solution