3 Chapter Test

Solve the equation using any method. Provide a reason for your choice.

1. $0 = x^2 + 2x + 3$

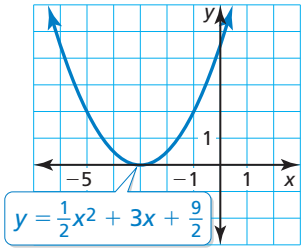
2. $6x = x^2 + 7$

3. $x^2 + 49 = 85$

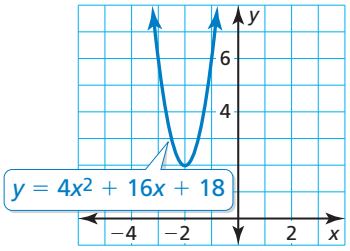
4. $(x + 4)(x - 1) = -x^2 + 3x + 4$

Explain how to use the graph to find the number and type of solutions of the quadratic equation. Justify your answer by using the discriminant.

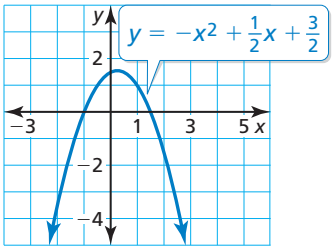
5. $\frac{1}{2}x^2 + 3x + \frac{9}{2} = 0$



6. $4x^2 + 16x + 18 = 0$



7. $-x^2 + \frac{1}{2}x + \frac{3}{2} = 0$



Solve the system of equations or inequalities.

8. $x^2 + 66 = 16x - y$

$2x - y = 18$

9. $y \geq \frac{1}{4}x^2 - 2$

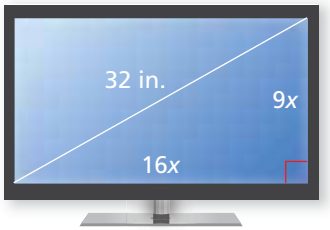
$y < -(x + 3)^2 + 4$

10. $0 = x^2 + y^2 - 40$

$y = x + 4$

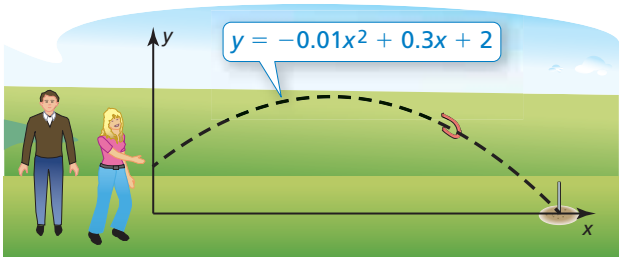
11. Write $(3 + 4i)(4 - 6i)$ as a complex number in standard form.

12. The *aspect ratio* of a widescreen TV is the ratio of the screen's width to its height, or 16 : 9. What are the width and the height of a 32-inch widescreen TV? Justify your answer. (*Hint:* Use the Pythagorean Theorem and the fact that TV sizes refer to the diagonal length of the screen.)



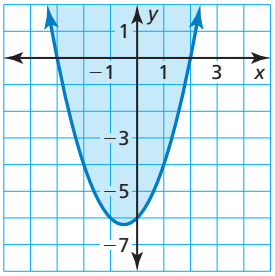
13. The shape of the Gateway Arch in St. Louis, Missouri, can be modeled by $y = -0.0063x^2 + 4x$, where x is the distance (in feet) from the left foot of the arch and y is the height (in feet) of the arch above the ground. For what distances x is the arch more than 200 feet above the ground? Justify your answer.

14. You are playing a game of horseshoes. One of your tosses is modeled in the diagram, where x is the horseshoe's horizontal position (in feet) and y is the corresponding height (in feet). Find the maximum height of the horseshoe. Then find the distance the horseshoe travels. Justify your answer.



3 Cumulative Assessment

1. The graph of which inequality is shown?



Ⓐ $y > x^2 + x - 6$

Ⓑ $y \geq x^2 + x - 6$

Ⓒ $y > x^2 - x - 6$

Ⓓ $y \geq x^2 - x - 6$

2. Classify each function by its function family. Then describe the transformation of the parent function.

a. $g(x) = x + 4$

b. $h(x) = 5$

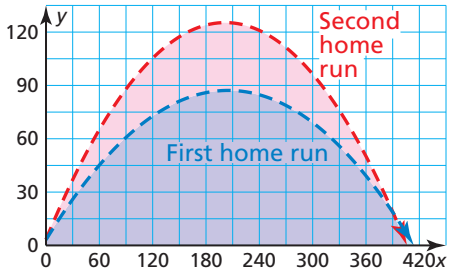
c. $h(x) = x^2 - 7$

d. $g(x) = -|x + 3| - 9$

e. $g(x) = \frac{1}{4}(x - 2)^2 - 1$

f. $h(x) = 6x + 11$

3. Two baseball players hit back-to-back home runs. The path of each home run is modeled by the parabolas below, where x is the horizontal distance (in feet) from home plate and y is the height (in feet) above the ground. Choose the correct symbol for each inequality to model the possible locations of the top of the outfield wall.



First home run: y ☐ $-0.002x^2 + 0.82x + 3.1$

Second home run: y ☐ $0.003x^2 + 1.21x + 3.3$

4. You claim it is possible to make a function from the given values that has an axis of symmetry at $x = 2$. Your friend claims it is possible to make a function that has an axis of symmetry at $x = -2$. What values can you use to support your claim? What values support your friend's claim?

Your claim
$f(x) =$ ☐ $x^2 +$ ☐ $x + 8$

Your friend's claim
$f(x) =$ ☐ $x^2 +$ ☐ $x + 8$

8	−6	−2	0
1	3	5	12

5. Which of the following values are x-coordinates of the solutions of the system?

$$y = x^2 - 6x + 14$$
$$y = 2x + 7$$

-9	-7	-5	-3	-1
1	3	5	7	9

6. The table shows the altitudes of a hang glider that descends at a constant rate. How long will it take for the hang glider to descend to an altitude of 100 feet? Justify your answer.

Time (seconds), t	Altitude (feet), y
0	450
10	350
20	250
30	150

Ⓐ 25 seconds

Ⓑ 35 seconds

Ⓒ 45 seconds

Ⓓ 55 seconds

7. Use the numbers and symbols to write the expression $x^2 + 16$ as the product of two binomials. Some may be used more than once. Justify your answer.

$+$	$-$	16	x	)
4	i	2	8	(

8. Choose values for the constants h and k in the equation $x = \frac{1}{4}(y - k)^2 + h$ so that each statement is true.

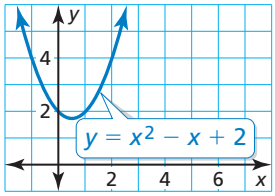
a. The graph of $x = \frac{1}{4}(y - \square)^2 + \square$ is a parabola with its vertex in the second quadrant.

b. The graph of $x = \frac{1}{4}(y - \square)^2 + \square$ is a parabola with its focus in the first quadrant.

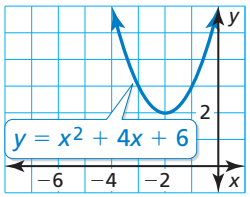
c. The graph of $x = \frac{1}{4}(y - \square)^2 + \square$ is a parabola with its focus in the third quadrant.

9. Which of the following graphs represent a perfect square trinomial? Write each function in vertex form by completing the square.

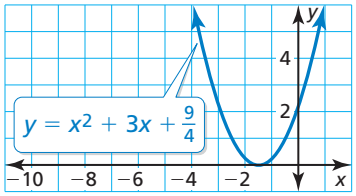
a.



b.



c.



d.