Do You Know HOW?

Find the equation of the axis of symmetry and the coordinates of the vertex of the graph of each function.

1. \( y = -5x^2 + 1 \) \( x = 0; (0, 1) \)
2. \( y = x^2 - 4x + 4 \) \( x = 2; (2, 0) \)

Graph each function.

3. \( y = \frac{1}{2}x^2 \)
4. \( y = x^2 - 3 \)

Graph each function. Label the axis of symmetry and the vertex.

5. \( y = 2x^2 + 8x \)
6. \( f(x) = x^2 + 2x + 1 \)
7. \( y = 3x^2 - x - 10 \)
8. \( y = x^2 - 5x + 4 \)

9. A water balloon is tossed into the air with an upward velocity of 25 ft/s. Its height \( h(t) \) in ft after \( t \) seconds is given by the function \( h(t) = -16t^2 + 25t + 3 \).
   a. After how many seconds will the balloon hit the ground? 1.67 sec
   b. What will the height be at \( t = 1 \) second? 12 ft
Chapter 9 Test A (continued)  Form K
Lessons 9-1 through 9-4

Solve each equation by finding square roots. If the equation has no real solution, write no solution.

10. \(x^2 - 81 = 0\)  \(\pm 9\)

11. \(x^2 - 121 = 0\)  \(\pm 11\)

12. \(3x^2 - 192 = 0\)  \(\pm 8\)

13. \(4x^2 - 144 = 0\)  \(\pm 6\)

Solve by factoring.

14. \(x^2 = -6x\)  0, -6

15. \(x^2 - 7x - 8 = 0\)  -1, 8

16. \(z^2 + 10z + 21 = 0\)  -3, -7

17. \(t^2 = 5t\)  0, 5

Do You UNDERSTAND?

18. How many \(x\)-intercepts will the graph of each function have?
   a. \(y = 3x^2\)  1
   b. \(y = 2x^2 + 3\)  0
   c. \(y = x^2 - 6x\)  2

19. Writing  Describe how you know by looking at the equation of a quadratic function whether the graph will open up or down.
   If the coefficient of the \(x^2\) term is positive, the graph opens up. If the coefficient of the \(x^2\) term is negative, the graph opens down.

20. Reasoning  Can you use the axis of symmetry to make graphing a quadratic equation easier? Explain.
   Yes, plot several points on one side of the axis of symmetry. Then reflect those points across the axis of symmetry to graph the other half of the quadratic equation.