

## Practice and Apply

## Key Help

See  
Examples

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Practice  
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Solve each equation by graphing.

11.  $c^2 - 5c - 24 = 0$

12.  $5n^2 + 2n + 6 = 0$

13.  $x^2 + 6x + 9 = 0$

14.  $b^2 - 12b + 36 = 0$

15.  $x^2 + 2x + 5 = 0$

16.  $r^2 + 4r - 12 = 0$

17. The roots of a quadratic equation are  $-2$  and  $-6$ . The minimum point of the graph of its related function is at  $(-4, -2)$ . Sketch the graph of the function.18. The roots of a quadratic equation are  $-6$  and  $0$ . The maximum point of the graph of its related function is at  $(-3, 4)$ . Sketch the graph of the function.19. **NUMBER THEORY** The sum of two numbers is  $9$ , and their product is  $20$ . Use a quadratic equation to determine the two numbers.20. **NUMBER THEORY** Use a quadratic equation to find two numbers whose sum is  $5$  and whose product is  $-24$ .

Solve each equation by graphing. If integral roots cannot be found, estimate the roots by stating the consecutive integers between which the roots lie.

21.  $a^2 - 12 = 0$

22.  $n^2 - 7 = 0$

23.  $2c^2 + 20c + 32 = 0$

24.  $3s^2 + 9s - 12 = 0$

25.  $x^2 + 6x + 6 = 0$

26.  $y^2 - 4y + 1 = 0$

27.  $a^2 - 8a = 4$

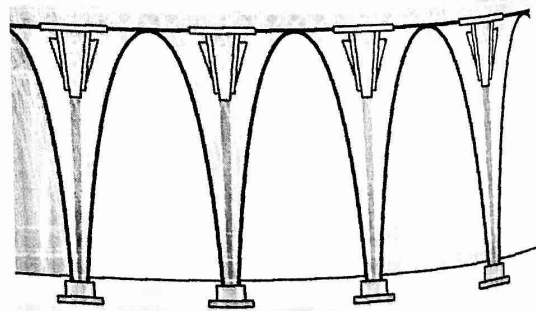
28.  $x^2 + 6x = -7$

29.  $m^2 - 10m = -21$

30.  $p^2 + 16 = 8p$

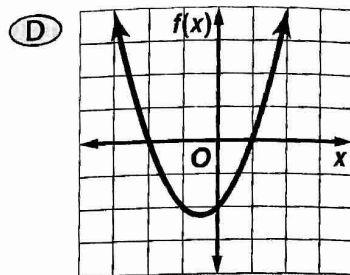
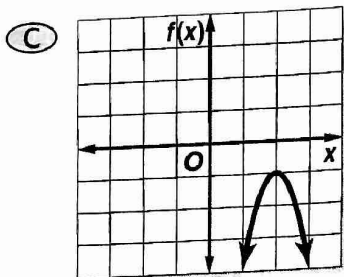
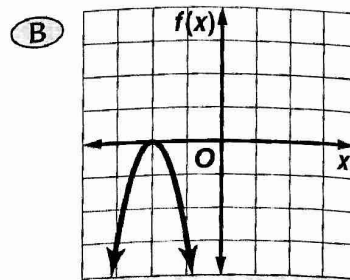
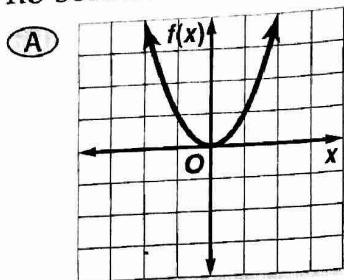
31.  $12n^2 - 26n = 30$

32.  $4x^2 - 35 = -4x$

33. One root of a quadratic equation is between  $-4$  and  $-3$ , and the other root is between  $1$  and  $2$ . The maximum point of the graph of the related function is at  $(-1, 6)$ . Sketch the graph of the function.34. One root of a quadratic equation is between  $-1$  and  $0$ , and the other root is between  $6$  and  $7$ . The minimum point of the graph of the related function is at  $(3, -5)$ . Sketch the graph of the function.**DESIGN** For Exercises 35-39, use the following information.An art gallery has walls that are sculptured with arches that can be represented by the quadratic function  $f(x) = -x^2 - 4x + 12$ , where  $x$  is in feet. The wall space under each arch is to be painted a different color from the arch itself.35. Graph the quadratic function and determine its  $x$ -intercepts.

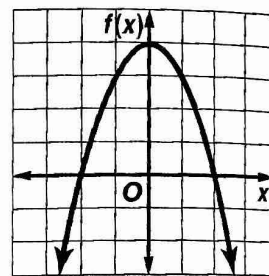
36. What is the length of the segment along the floor of each arch?

49. Which graph represents a function whose corresponding quadratic equation has no solutions?



50. What are the root(s) of the quadratic equation whose related function is graphed at the right?

- (A) -2, 2                      (B) 0  
(C) 4                              (D) 0, 4



**CUBIC EQUATIONS** An equation of the form  $ax^3 + bx^2 + cx + d = 0$  is called a cubic equation. You can use a graphing calculator to graph and solve cubic equations.

Use the graph of the related function of each cubic equation to estimate the roots of the equation.

51.  $x^3 - x^2 - 4x + 4 = 0$

52.  $2x^3 - 11x^2 + 13x - 4 = 0$

## Obtain Your Skills

### Extended Review

Write the equation of the axis of symmetry, and find the coordinates of the vertex of the graph of each function. Identify the vertex as a maximum or minimum. Then graph the function. (Lesson 10-1)

53.  $y = x^2 + 6x + 9$

54.  $y = -x^2 + 4x - 3$

55.  $y = 0.5x^2 - 6x + 5$

Solve each equation. Check your solutions. (Lesson 9-6)

56.  $m^2 - 24m = -144$

57.  $7r^2 = 70r - 175$

58.  $4d^2 + 9 = -12d$

Simplify. Assume that no denominator is equal to zero. (Lesson 8-2)

59.  $\frac{10m^4}{30m}$

60.  $\frac{22a^2b^5c^7}{-11abc^2}$

61.  $\frac{-9m^3n^5}{27m^{-2}n^5y^{-4}}$

62. **SHIPPING** An empty book crate weighs 30 pounds. The weight of a book is \_\_\_\_\_ and no more