

Name _____

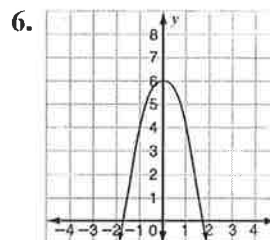
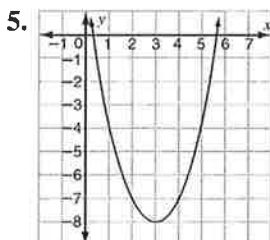
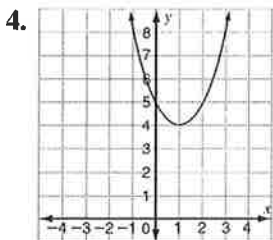
Tell whether the graph of the quadratic function opens upward or downward. Explain.

1. $y - 3 = 6x + 2x^2$

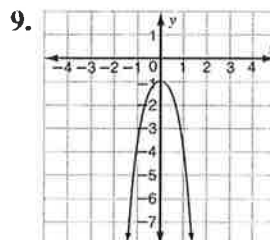
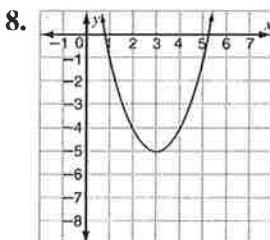
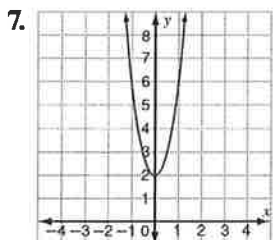
2. $y + 3x^2 = -4$

3. $5y + 3x^2 = 9$

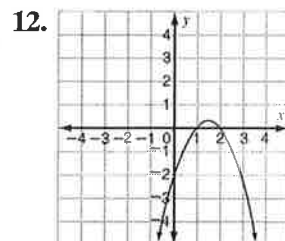
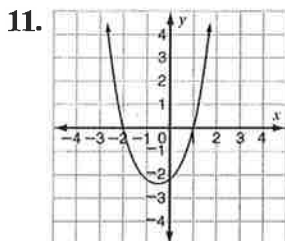
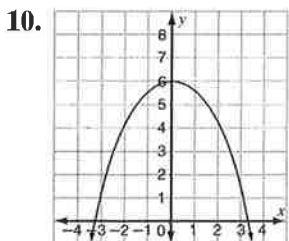
For each parabola, identify the vertex. Then give the minimum or maximum value of the function. Explain.



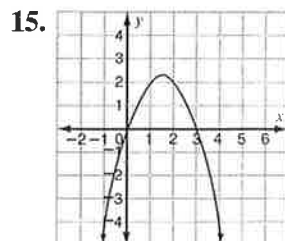
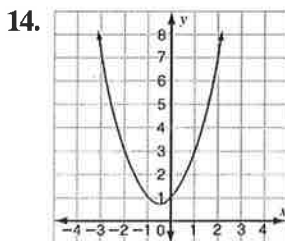
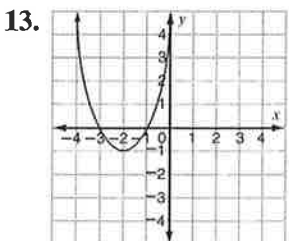
For each parabola, identify the domain and range.



For each parabola, identify the axis of symmetry.



For each parabola, identify the x -intercepts.



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Solve. Show all your work. Explain how you got your answer.

16. What are the domain and range of any parabola with a vertex of $(-1, 5)$ that opens downward? Explain.

17. The axis of symmetry of a parabola is $x = \frac{5}{4}$. The domain is all real numbers and the range is $\{y | y \geq \frac{8}{3}\}$. Does this function have x -intercepts? Explain.

Write the equation of the axis of symmetry, and find the coordinates of the vertex of the parabola. Use a separate sheet of paper to make a function table and graph each function.

18. $y = x^2 - 2x + 5$

19. $y = x^2 - 6x + 1$

20. $y = -x^2 + 10x - 24$

21. $y = x^2 + 4x + 10$

22. $y = -2x^2 + 4x - 8$

23. $y = -x^2 - 6x - 5$

24. $y = x^2 + 4x + 3$

25. $y = 4x^2 - 8$

26. $y = 4x^2 + 8x + 16$

27. $y = -2x^2 - 16x - 26$

28. $y = 2x^2 + 2.5$

29. $y = \frac{1}{8}x^2 + x - 3$

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Solve each equation by factoring. Check the solution on a separate sheet of paper.

30. $x^2 + 3x = 18$

31. $2x^2 - 4x = 48$

32. $49x^2 - 81 = 0$

33. $256 = x^2$

34. $24x^2 - 8 = 4x$

35. $60 = x^2 + 7x$

36. $3x^2 + 8 = -25x$

37. $50x^2 = 20x - 2$

38. $9 - 100x^2 = 0$

39. $15x^2 = -8x + 3$

40. $8x^2 + 20x = 12$

41. $x = \sqrt{4x + 21}$

42. $x = \sqrt{9x - 20}$

43. $4x = \sqrt{8x + 3}$

44. $3x = \sqrt{5 - 2x}$

45. $3x = \sqrt{9x - 2}$

Solve. Show all your work. Explain how you got your answer.

46. The product of two consecutive integers is 132. What are the integers?

47. The product of two consecutive negative integers is 72. What are the integers?

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Solve each equation by completing the square. Then check.

11. $x^2 - 6x - 16 = 0$

12. $x^2 + 8x + 11 = 0$

13. $x^2 + 5x - 6 = 0$

14. $x^2 - 9x + 8 = 0$

15. $x^2 - 4x - 6 = 0$

16. $2x^2 + 7x - 15 = 0$

17. $x^2 + 3x - 28 = 0$

18. $3x^2 - 2x - 5 = 0$

19. $5x^2 + 2 + 11x = 0$

20. $7x^2 + 6 = 23x$

21. $7x^2 = 42x - 52$

22. $6x = 4x^2 - 1$

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Simplify each expression.

47. $4\sqrt{3m} + 4\sqrt{5} - 5\sqrt{3m} + 8\sqrt{5}$

48. $-2\sqrt{b} + 5\sqrt{c} + 3\sqrt{c} + 2\sqrt{b}$

49. $x\sqrt{196} + \sqrt{18x} - \sqrt{50x} + x\sqrt{169}$

50. $\sqrt{121t^2} - \sqrt{3t^3} + \sqrt{4t^2} - \sqrt{27t^3}$

51. $-p^2\sqrt{147} + 3p\sqrt{27} + \sqrt{75p^4}$

52. $\sqrt{99k^2} - \sqrt{88} - |k|\sqrt{176}$

53. $|n|\sqrt{800} - 2\sqrt{128n^2} - n^2\sqrt{450}$

54. $e^2\sqrt{40d^4} + 3\sqrt{160d^4e^4} - 2d^2\sqrt{490e^4}$

Solve. Show your work.

55. The width of a rectangular porch is $6\sqrt{3} - 3\sqrt{6}$ feet and its length is $3\sqrt{6} + 6\sqrt{3}$ feet. What is the perimeter of the porch?

56. A triangle has a perimeter of $3\sqrt{5} + 3\sqrt{10} + \sqrt{6}$ inches. Two of its sides measure $2\sqrt{5} - \sqrt{10}$ inches and $\sqrt{5} + 3\sqrt{6}$ inches. What is the length of the third side?

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Simplify each radical expression. Assume that all variables represent nonnegative numbers.

19. $\frac{\sqrt{6}}{\sqrt{5}}$

20. $\frac{\sqrt{12}}{\sqrt{6}}$

21. $\frac{\sqrt{27}}{\sqrt{12}}$

22. $\frac{\sqrt{18}}{\sqrt{5}}$

23. $\frac{35}{\sqrt{7}}$

24. $\frac{3a}{\sqrt{18}}$

25. $\frac{4b}{\sqrt{6}}$

26. $\frac{15b}{\sqrt{30b}}$

27. $\frac{16\sqrt{g}}{\sqrt{14}}$

28. $\sqrt{\frac{5x}{3}}$

29. $\sqrt{\frac{7r}{2}}$

30. $\sqrt{\frac{27p}{6}}$

31. $\frac{\sqrt{3} + \sqrt{5}}{\sqrt{7}}$

32. $\frac{\sqrt{10} - \sqrt{15}}{\sqrt{5}}$

33. $\frac{2\sqrt{3} + 6\sqrt{5}}{\sqrt{2}}$

34. $\frac{\sqrt{21} - \sqrt{6}}{\sqrt{14}}$

35. $\frac{m\sqrt{15m} - \sqrt{21m}}{-\sqrt{3m}}$

36. $\frac{\sqrt{6m} - m\sqrt{6}}{m\sqrt{3m}}$

37. $\frac{19x - 11\sqrt{x}}{x\sqrt{x}}$

38. $\frac{4c^2 + 6c}{\sqrt{2c}}$

Solve. Show your work.

39. The base of a triangle measures
- $\sqrt{10} - \sqrt{6}$
- units. The height is
- $\sqrt{2}$
- units. What is the area of the triangle? (
- Hint: Area = $\frac{1}{2}bh$*
-)

40. The base of a parallelogram measures
- $2\sqrt{5} + \sqrt{6}$
- units. The height is
- $2\sqrt{5} - \sqrt{6}$
- units. What is the area of the parallelogram? (
- Hint: Area = bh*
-)

41. The area of a rectangle is
- $16\sqrt{3}$
- square units. The length measures
- $3\sqrt{2}$
- units. What is the width of the rectangle? (
- Hint: Area = ℓw*
-)

42. The length of a rectangle measures
- $\sqrt{14}$
- units. The area is
- $6\sqrt{7} - 7\sqrt{2}$
- square units. What is the width of the rectangle? (
- Hint: Area = ℓw*
-)

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Solve each equation. Check your solution. If there is no solution, write *no real solution*.

43. $\sqrt{x} = 15$

44. $\sqrt{y} = -15$

45. $3\sqrt{z} = 15$

46. $\sqrt{s - 10} = 13$

47. $-10 + \sqrt{t} = 13$

48. $\sqrt{10 - u} = 13$

49. $-6\sqrt{p} = -15$

50. $-6\sqrt{p} = 15$

51. $\sqrt{6p} = 15$

52. $2\sqrt{a + 1} = 10$

53. $\frac{\sqrt{b + 1}}{2} = 10$

54. $\frac{1 + \sqrt{c}}{2} = 10$

55. $7 + \sqrt{x - 2} = 4$

56. $\sqrt{5z - 1} = 8$

57. $1 + \sqrt{3n} = 4$

58. $7\sqrt{3m - 4} = 42$

59. $-6\sqrt{1 - x} = 12$

60. $5 - 3\sqrt{5f + 1} = -7$

61. $3 - 5\sqrt{4k} = -27$

62. $1 + \sqrt{15 - x} = 4$

63. $5 + \frac{3}{4}\sqrt{r + 7} = 8$

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Solve. Show your work. Explain how you got your answer.

22. The area of a rectangle is represented by $ab - ac + bc - c^2$. If $(b - c)$ represents the length, what binomial expression represents the width?

23. The volume of a rectangular prism is represented by $x^3 + 4x^2 - 9x - 36$. If the binomial $(x^2 - 9)$ represents the area of the base, what binomial expression represents the height?

Factor completely. Check using multiplication. If the polynomial cannot be factored using integers, label it *prime*.

24. $15b^2 - 34b + 15$

25. $12w^2 + 34wx + 10x^2$

26. $-25 + g^2$

27. $3h^3 - 6h^2$

28. $d - de + e$

29. $-36m + mn^2 - 9mn$

30. $121s^3 - 64s$

31. $18qs + 9qt + 2rs + rt$

32. $12t^3 - 4t - 4t^2$

33. $25x^2 - 6y^2$

34. $-5m^2 + 4mn + 12n^2$

35. $-3a^2b^2 + 2a^3b^2 + 16ab^2 - 24b^2$

36. $8p^2r^2 + 45pqr^2 - 18q^2r^2$

37. $6x^2 - 7xy + 5y^2$

38. $s^3t^4u^5 + s^2t^3u^4 + st^2u^3$