

NAME _____ DATE _____ PERIOD _____

4-1 Practice

Graphing Quadratic Functions

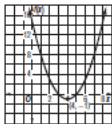
Complete parts a–c for each quadratic function.

- Find the y -intercept, the equation of the axis of symmetry, and the x -coordinate of the vertex.
- Make a table of values that includes the vertex.
- Use this information to graph the function.

1. $f(x) = x^2 - 8x + 15$

15; $x = 4$; 4

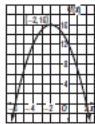
x	0	2	4	6	8
$f(x)$	15	3	-1	3	15



2. $f(x) = -x^2 - 4x + 12$

12; $x = -2$; -2

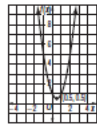
x	-6	-4	-2	0	2
$f(x)$	0	12	16	12	0



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

1; $x = 0.5$; 0.5

x	-1	0	0.5	1	2
$f(x)$	5	1	0.5	1	5



Determine whether each function has a *maximum* or *minimum* value, and find that value. Then state the domain and range of the function.

4. $f(x) = x^2 + 2x - 8$

min.; -9; all reals;

$\{f(x) \mid f(x) \geq -9\}$

5. $f(x) = x^2 - 6x + 14$

min.; 5; all reals;

$\{f(x) \mid f(x) \geq 5\}$

6. $v(x) = -x^2 + 14x - 57$

max.; -8; all reals;

$\{f(x) \mid f(x) \leq -8\}$

7. $f(x) = 2x^2 + 4x - 6$

min.; -8; all reals;

$\{f(x) \mid f(x) \geq -8\}$

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

max.; 3; all reals;

$\{f(x) \mid f(x) \leq 3\}$

9. $f(x) = \frac{2}{3}x^2 + 8x - 24$

max.; 0; all reals;

$\{f(x) \mid f(x) \leq 0\}$

10. **GRAVITATION** From 4 feet above a swimming pool, Susan throws a ball upward with a velocity of 32 feet per second. The height $h(t)$ of the ball t seconds after Susan throws it is given by $h(t) = -16t^2 + 32t + 4$. For $t \geq 0$, find the maximum height reached by the ball and the time that this height is reached. **20 ft; 1 s**

11. **HEALTH CLUBS** Last year, the SportsTime Athletic Club charged \$20 to participate in an aerobic class. Seventy people attended the classes. The club wants to increase the class price this year. They expect to lose one customer for each \$1 increase in the price.

a. What price should the club charge to maximize the income from the aerobics classes? **\$45**

b. What is the maximum income the SportsTime Athletic Club can expect to make? **\$2025**

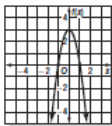
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4-2 Practice

Solving Quadratic Equations By Graphing

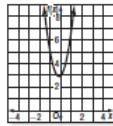
Use the related graph of each equation to determine its solutions.

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



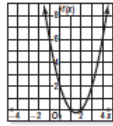
-1, 1

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



no real solutions

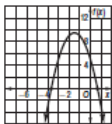
3. $x^2 - 3x + 2 = 0$



1, 2

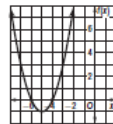
Solve each equation. If exact roots cannot be found, state the consecutive integers between which the roots are located.

4. $-2x^2 - 6x + 5 = 0$



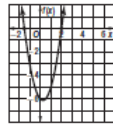
between 0 and 1;
between -4 and -3

5. $x^2 + 10x + 24 = 0$



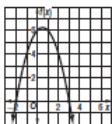
-6, -4

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



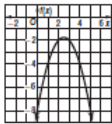
-1.5, 2

7. $-x^2 + x + 6 = 0$



3, -2

8. $-x^2 + 5x - 8 = 0$



no such real numbers exist

9. **GRAVITY** Use the formula $h(t) = v_0 t - 16t^2$, where $h(t)$ is the height of an object in feet, v_0 is the object's initial velocity in feet per second, and t is the time in seconds.

- a. Marta throws a baseball with an initial upward velocity of 60 feet per second. Ignoring Marta's height, how long after she releases the ball will it hit the ground?
3.75 s
- b. A volcanic eruption blasts a boulder upward with an initial velocity of 240 feet per second. How long will it take the boulder to hit the ground if it lands at the same elevation from which it was sited?
15 s

4-3 Practice

Solving Quadratic Equations by Factoring

Write a quadratic equation in standard form with the given root(s).

- | | | |
|--|--|---|
| 1. 7, 2
$x^2 - 9x + 14 = 0$ | 2. 0, 3
$x^2 - 3x = 0$ | 3. -5, 8
$x^2 - 3x - 40 = 0$ |
| 4. -7, -8
$x^2 + 15x + 56 = 0$ | 5. -6, -3
$x^2 + 9x + 18 = 0$ | 6. 3, -4
$x^2 + x - 12 = 0$ |
| 7. $1, \frac{1}{2}$
$2x^2 - 3x + 1 = 0$ | 8. $\frac{1}{3}, 2$
$3x^2 - 7x + 2 = 0$ | 9. $0, -\frac{7}{2}$
$2x^2 + 7x = 0$ |

Factor each polynomial.

- | | | |
|---|---|---|
| 10. $r^3 + 3r^2 - 54r$
$r(r + 9)(r - 6)$ | 11. $8a^2 + 2a - 6$
$2(4a - 3)(a + 1)$ | 12. $c^2 - 49$
$(c - 7)(c + 7)$ |
| 13. $x^2 + 8$
$(x + 2)(x^2 - 2x + 4)$ | 14. $16r^2 - 169$
$(4r + 13)(4r - 13)$ | 15. $b^4 - 81$
$(b^2 + 9)(b + 3)(b - 3)$ |

Solve each equation by factoring.

- | | |
|---|---|
| 16. $x^2 - 4x - 12 = 0$ {6, -2} | 17. $x^2 - 16x + 64 = 0$ {8} |
| 18. $x^2 - 6x + 8 = 0$ {2, 4} | 19. $x^2 + 3x + 2 = 0$ {-2, -1} |
| 20. $x^2 - 4x = 0$ {0, 4} | 21. $7x^2 = 4x$ $\left\{0, \frac{4}{7}\right\}$ |
| 22. $10x^2 = 9x$ $\left\{0, \frac{9}{10}\right\}$ | 23. $x^2 = 2x + 99$ {-9, 11} |
| 24. $x^2 + 12x = -36$ {-6} | 25. $5x^2 - 35x + 60 = 0$ {3, 4} |
| 26. $36x^2 = 25$ $\left\{\frac{5}{6}, -\frac{5}{6}\right\}$ | 27. $2x^2 - 8x - 90 = 0$ {9, -5} |

28. **NUMBER THEORY** Find two consecutive even positive integers whose product is 624.
24, 26
29. **NUMBER THEORY** Find two consecutive odd positive integers whose product is 323.
17, 19
30. **GEOMETRY** The length of a rectangle is 2 feet more than its width. Find the dimensions of the rectangle if its area is 63 square feet. **7 ft by 9 ft**