Math 2 - Midterm Quiz

Multiple Choice
Identify the choice that best completes the statement or answers the question.

Solve the proportion.

1. $\dfrac{6}{a} = \dfrac{18}{27}$
   a. 54
   b. 81
   c. 9
   d. 18

2. $\dfrac{3y - 8}{12} = \dfrac{y}{5}$
   a. -10
   b. -7
   c. $\dfrac{3}{40}$
   d. $\dfrac{40}{3}$

3. The total number of horses and people at the riding academy for the Sunday session was 39. The total number of legs at the academy that day was 124. How many people were at the riding academy that Sunday?
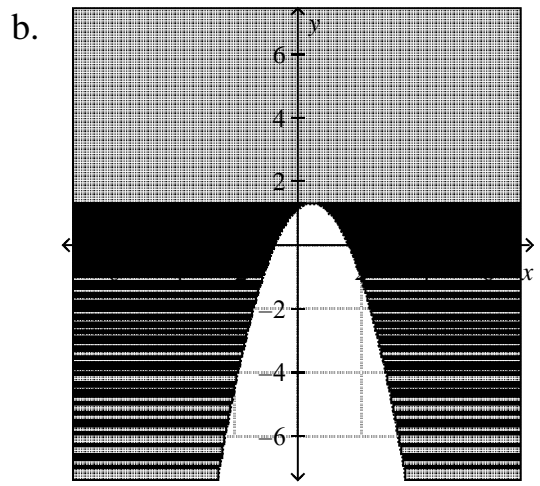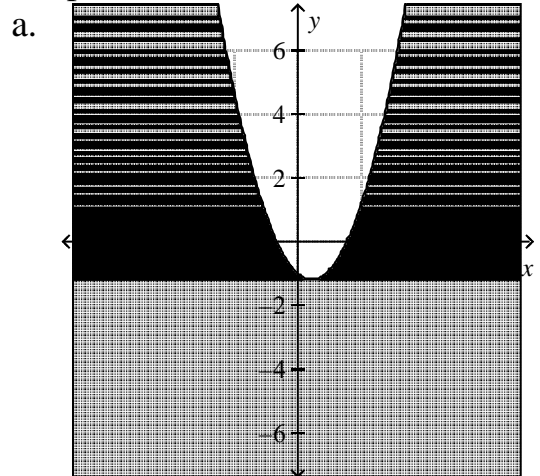   a. 27 people
   b. 16 people
   c. 23 people
   d. 12 people

4. Based on the pattern, what is the next figure in the sequence?
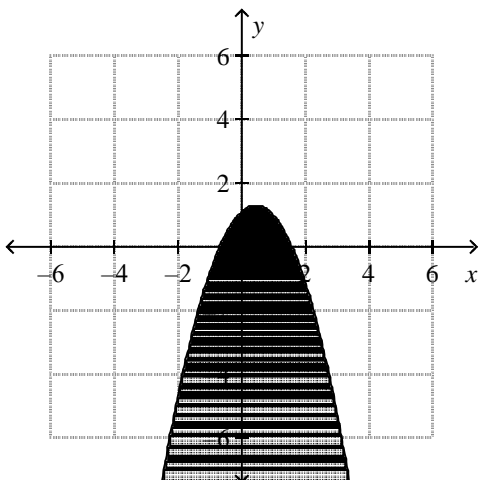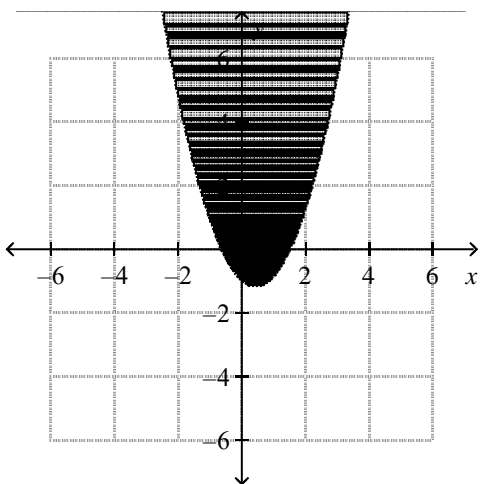
   a.
   b.
   c.
   d.

5. Graph $f(x) \le x^2 - x - 1$.
   a.

   b.

c.

d.

Factor the expression.

6. $x^2 - 6x + 8$
    a. $(x + 4)(x + 2)$
    b. $(x - 2)(x - 4)$
    c. $(x - 4)(x + 2)$
    d. $(x - 2)(x + 4)$

7. $3x^2 + 26x + 35$
    a. $(x + 5)(3x + 7)$
    b. $(3x + 7)(x - 5)$
    c. $(3x + 5)(x - 7)$

d. $(3x + 5)(x + 7)$

8. $m^2 - 11m + 30$
    a. $(m + 6)(m + 5)$
    b. $(m - 6)(m + 5)$
    c. $(m - 6)(m - 5)$
    d. $(m + 6)(m - 5)$

Solve the equation.

9. $\sqrt{x + 10} - 7 = -5$
    a. 14
    b. −8
    c. 4
    d. −6

10. $9 + 8n = 41$
    a. 7
    b. 6
    c. 5
    d. 4

11. Factor the left - hand side and use the square root method to solve
    $x^2 + 18x + 81 = 25$
    a. 14, 4
    b. −4, −14
    c. 14, −14
    d. −4, 4

Describe the graph of the function.

12. $y = |x - 4| - 7$
    a. The graph is an absolute value function with vertex (7, –4).

b. The graph is an absolute value function with vertex (–4, –7).

c. The graph is an absolute value function with vertex (–4, 7).

d. The graph is an absolute value function with vertex (4, –7).

13. $y = \sqrt{x - 6} + 2$

   a. The graph is the radical function $y = \sqrt{x}$ shifted right 6 units and up 2 units.

   b. The graph is the radical function $y = \sqrt{x}$ shifted left 6 units and up 2 units.

   c. The graph is the radical function $y = \sqrt{x}$ shifted right 6 units and down 2 units.

   d. The graph is the radical function $y = \sqrt{x}$ shifted left 2 units and up 6 units.

Subtract if possible.

14. $2\sqrt[4]{5a} - 6\sqrt[4]{5a}$

   a. $-20\sqrt[4]{5a}$

   b. $8\sqrt[4]{5a}$
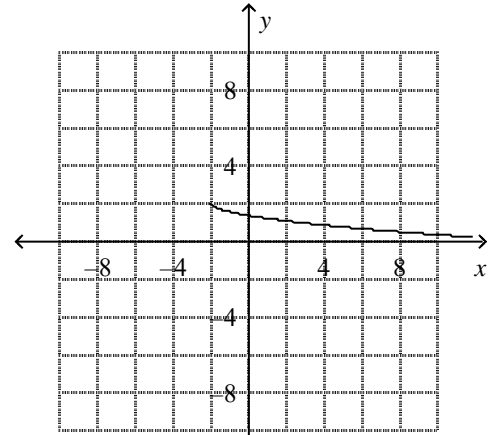
   c. $-4\sqrt[4]{5a}$

   d. not possible to simplify

15. A balloon takes off from a location that is 158 ft above sea level. It rises 56 ft/min. Write an equation to model the balloon's elevation h as a function of time t.

   a. $t = 158h + 56$

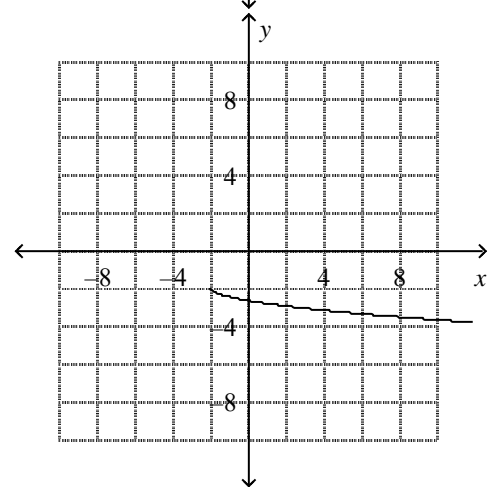   b. $h = 56t + 158$

c. $h = 158t + 56$

d. $t = 56h + 158$
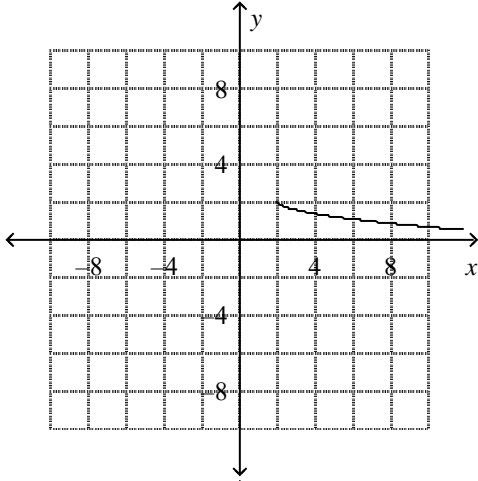
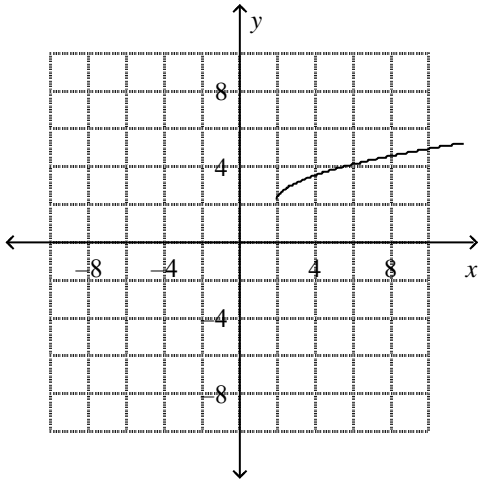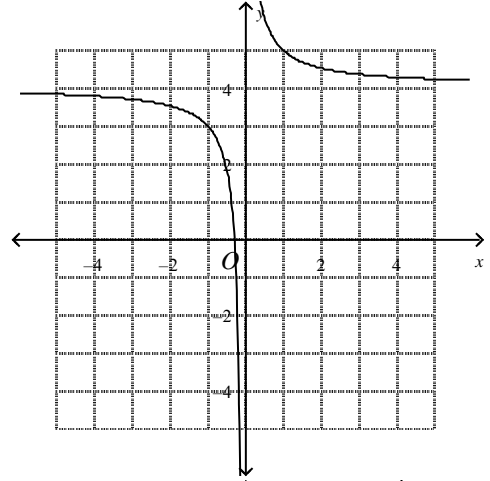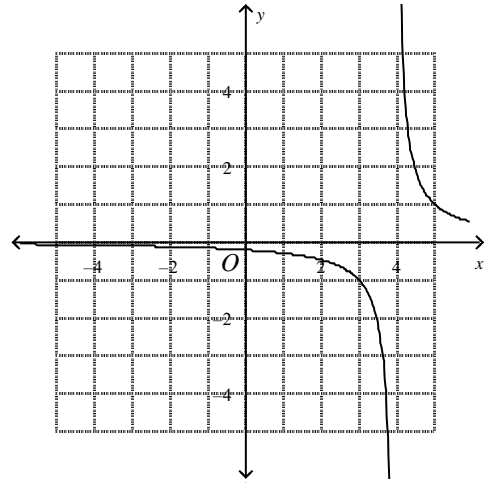**Graph the function.**

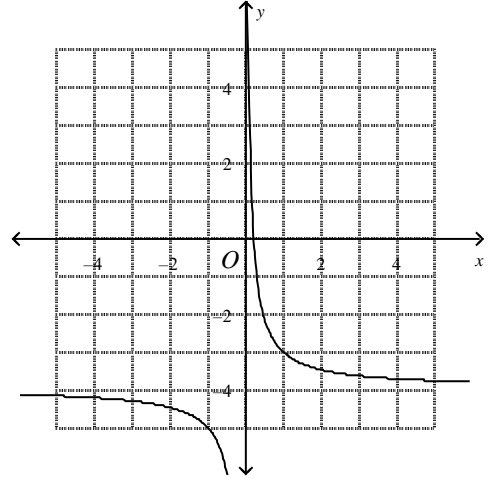16. $y = -0.5\sqrt{x - 2} + 2$
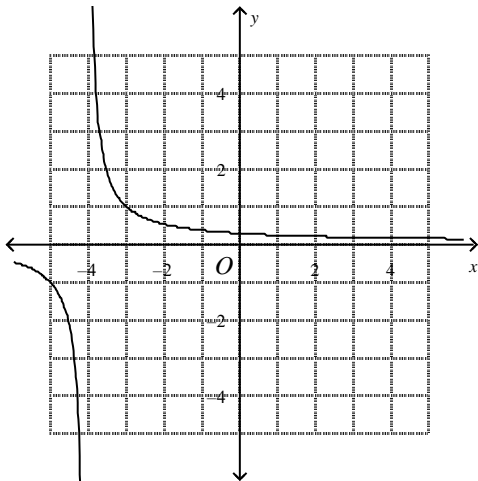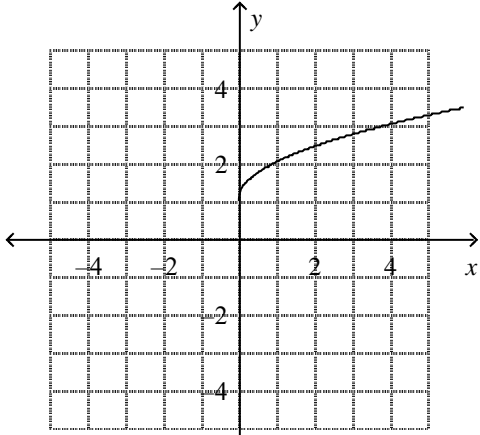
   a.

   b.
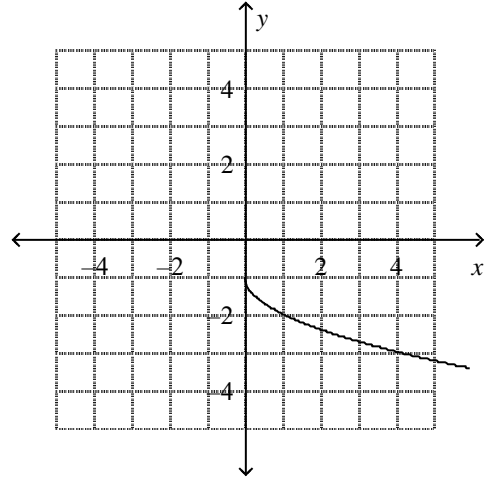
c.

d.

b.

c.

d.

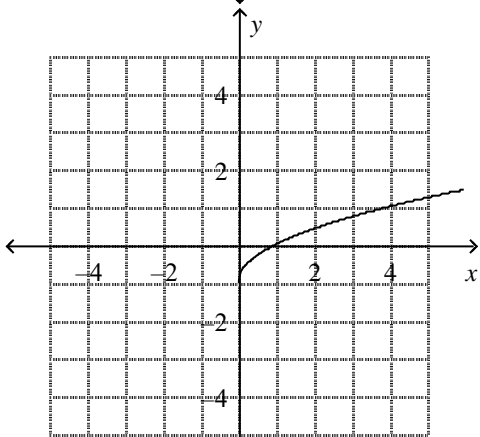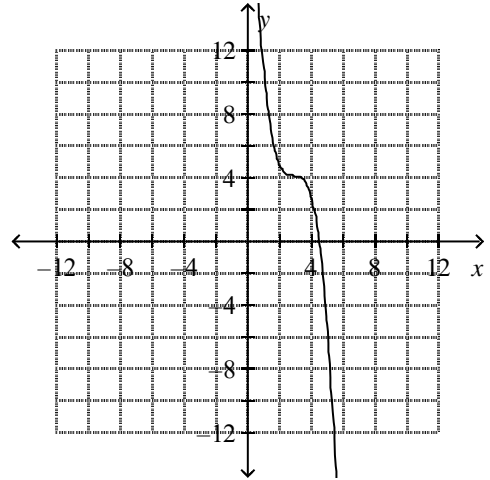
17. $f(x) = \dfrac{1}{x + 4}$
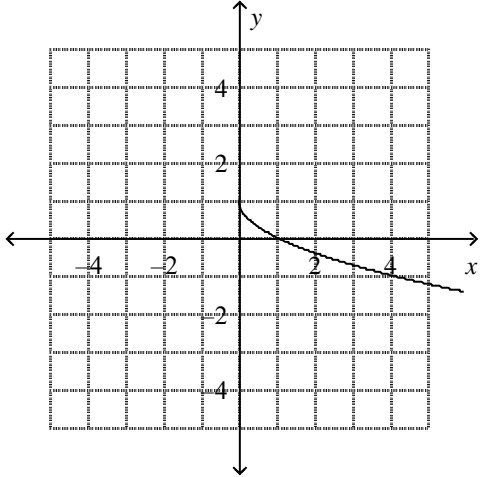
a.

18. $y = \sqrt{x} + 1$

a.

d.

b.

19. $y = -\sqrt[3]{x - 3} + 4$
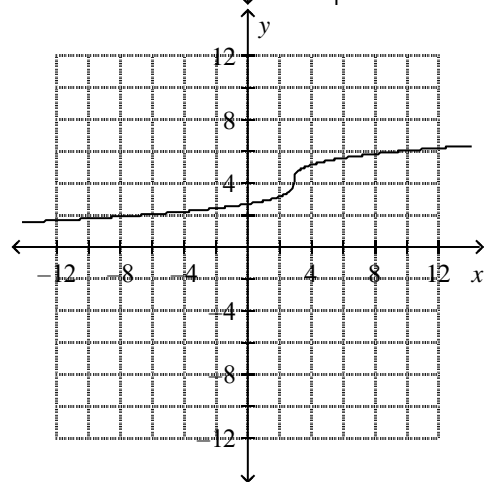
a.

c.

b.

c.
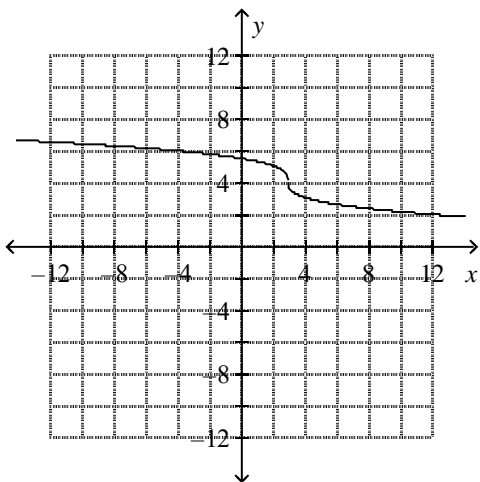
d.
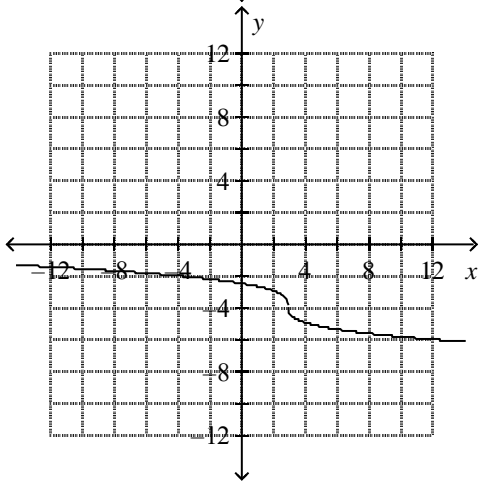
20. Write the expression $(x + 6)(x - 4)$ as a polynomial in standard form.
    a. $x^2 - 10x + 2$
    b. $x^2 + 10x - 24$
    c. $x^2 + 2x - 24$
    d. $x^2 + 10x - 10$

21. The vertices of a triangle are $P(-7, -4)$, $Q(-7, -8)$, and $R(3, -3)$. Name the vertices of the image reflected in the line $y = x$.
    a. $P'(4, 7), Q'(8, 7), R'(3, -3)$
    b. $P'(4, -7), Q'(8, -7), R'(3, 3)$
    c. $P'(-4, -7), Q'(-8, -7), R'(-3, 3)$
    d. $P'(-4, 7), Q'(-8, 7), R'(-3, -3)$

22. Describe how the graph of $g(x) = \frac{3}{x - 4}$ + 5 is a translation of $g(x) = \frac{3}{x}$.
    a. It is a translation of $g(x) = \frac{3}{x}$, 4 units right and 5 units down.
    b. It is a translation of $g(x) = \frac{3}{x}$, 4 units right and 5 units up.
    c. It is a translation of $g(x) = \frac{3}{x}$, 4 units left and 5 units up.
    d. It is a translation of $g(x) = \frac{3}{x}$, 4 units left and 5 units down.

23. Write the equation for the translation of $y = |x|$.
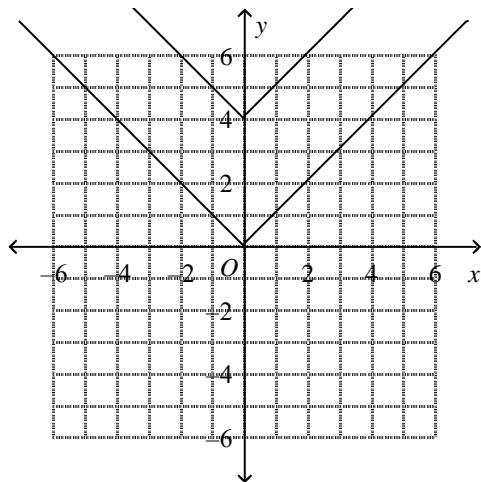
a. $y = |x + 4|$
b. $y = |x| + 4$
c. $y = |x| - 4$
d. $y = |x - 4|$

24. Suppose $r = -2$, $d = -8$, and $e = 1$.Which expression equals -17?
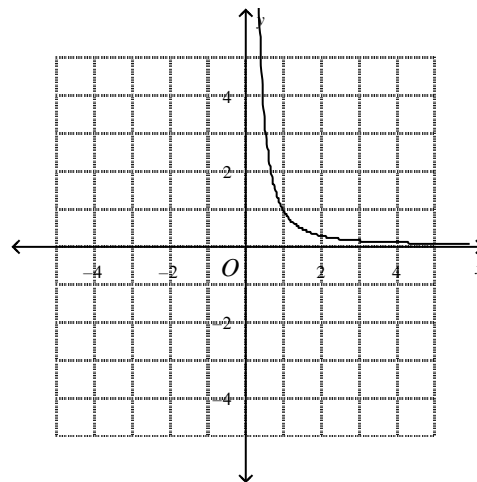   a. $2r + 2d + 3e$
    b. $-8r + 3d + 2e$
    c. $3r + 4d + 4e$
    d. $7r + 2d + 3e$

25. Write the radical expression $\dfrac{8}{\sqrt[7]{x^{15}}}$ in exponential form.
    a. $8x^{-\frac{7}{15}}$
    b. $8x^{\frac{15}{7}}$
    c. $8x^{-\frac{15}{7}}$
    d. $8x^{\frac{7}{15}}$

26. Find the domain and range of the relation and determine whether it is a function.

a. Domain: all real numbers; range: all real numbers; yes, it is a function
b. Domain: $x > 0$; range: $y > 0$; yes, it is a function.
c. Domain: positive integers; range: positive integers; no, it is not a function.
d. Domain: $x \geq 0$; range: $y \leq 0$; no, it is not a function.

27. The day before the parade, the school band's starting point was changed. The band director called three band members. Each of these band members called 4 other band members. Then all of these band members called three members. How many band members, including the band director, are notified of the new starting point?
    a. 40 band members
    b. 51 band members
    c. 36 band members
    d. 28 band members

Solve the equation using the zero-product property.

28. $-8n(10n - 1) = 0$

    a. $n = -\dfrac{1}{8}$ or $n = -\dfrac{1}{10}$

    b. $n = 0$ or $n = \dfrac{1}{10}$

    c. $n = 0$ or $n = -\dfrac{1}{10}$

    d. $n = -\dfrac{1}{8}$ or $n = \dfrac{1}{10}$

29. Simplify $\sqrt{-175}$ using the imaginary number i.

    a. $i\sqrt{175}$

    b. $5i\sqrt{7}$

    c. $5\sqrt{-7}$

    d. $-5\sqrt{7}$

30. A group of 52 people attended a ball game. There were three times as many children as adults in the group. Set up a system of equations that represents the numbers of adults and children who attended the game and solve the system to find the number of children who were in the group.

    a. $\begin{cases} a + c = 52 \\ a = c + 3 \end{cases}$; 39 adults; 25 children

    b. $\begin{cases} a + c = 52 \\ a = 3c \end{cases}$; 39 adults, 13 children

    c. $\begin{cases} a + c = 52 \\ c = a + 3 \end{cases}$; 25 adults; 39 children

    d. $\begin{cases} a + c = 52 \\ c = 3a \end{cases}$; 13 adults, 39 children

31. Name the translation image of $\triangle ABC$ after a reflection over line t and then a reflection over line r.

    a. $\triangle UVW$

    b. $\triangle LMN$

    c. $\triangle XYZ$
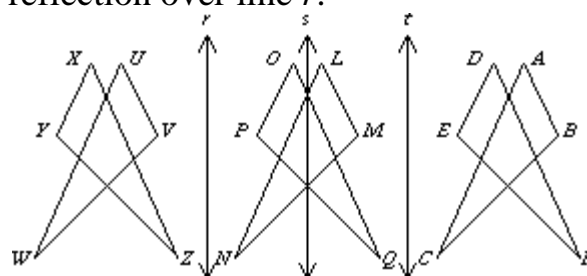
    d. $\triangle DEF$

Solve the quadratic equation by completing the square.

32. $-3x^2 + 7x = -5$

    a. $\dfrac{7}{6} \pm \dfrac{\sqrt{109}}{6}$

    b. $-\dfrac{7}{3} \pm \dfrac{\sqrt{109}}{3}$

    c. $\dfrac{7}{3} \pm \dfrac{\sqrt{67}}{3}$

    d. $-\dfrac{7}{6} \pm \dfrac{\sqrt{22}}{6}$

33. $x^2 + 10x + 14 = 0$

    a. -10 ± 6

    b. $100 \pm \sqrt{11}$

    c. 5 ± 6

    d. $-5 \pm \sqrt{11}$

Solve the equation by finding square roots.

34. $3x^2 = 21$
   a. $\sqrt{7}$
   b. $\sqrt{7}, -\sqrt{7}$
   c. $\dfrac{-\sqrt{21}}{3}, \dfrac{\sqrt{21}}{3}$
   d. $-\sqrt{7}, \sqrt{21}$

Simplify. Write the answer in standard form.

35. $2(d^2 - 9d - 5) + (d^2 - 9)$
   a. $3d^2 + 18d - 10$
   b. $2d^2 - 27d - 10$
   c. $3d^2 - 18d - 19$
   d. $2d^2 - 27d + 19$

36. $(3g^2 - 8g - 4) - (6g^2 + 4g - 5)$
   a. $9g^2 - 12g + 9$
   b. $9g^2 + 12g - 1$
   c. $-3g^2 - 12g + 1$
   d. $-3g^2 + 12g + 1$

Simplify.

37. $\sqrt{32}$
   a. 8
   b. 2
   c. $4\sqrt{2}$
   d. $8\sqrt{2}$

38. $(3m + 8)^2$
   a. $9m^2 + 48m - 64$
   b. $9m^2 + 24m - 64$
   c. $9m^2 - 48m + 64$
   d. $9m^2 + 48m + 64$

39. $(-2.7)^0$
   a. 0
   b. −1
   c. 1
   d. −2.7

40. LaKeesha was sitting in seat J1 at a soccer game when she discovered her ticket was for seat D4. Write a rule to describe the translation needed to put her in the proper seat.
   a. $(x - 6, y - 3)$
   b. $(x - 6, y + 3)$
   c. $(x + 6, y - 3)$
   d. $(x + 6, y + 3)$

41. A ball is thrown into the air with an upward velocity of 36 ft/s. Its height h in feet after t seconds is given by the function $h = -16t^2 + 36t + 9$.
   a. In how many seconds does the ball reach its maximum height? Round to the nearest hundredth if necessary.
   b. What is the ball's maximum height?
   a. 1.13 s; 69.75 ft
   b. 1.13 s; 29.25 ft
   c. 1.13 s; 31.5 ft
   d. 2.25 s; 9 ft

Simplify the radical expression. Use absolute value symbols if needed.

42. $\sqrt[4]{81x^{20}y^8}$
   a. $3|x^5|y^2$

b. $9|x^{25}|y^4$
c. $9x^{25}|y^4|$
d. $3x^5|y^2|$

c. $\langle 5, 8 \rangle$, $(0, 9)$

d. $\langle -5, -8 \rangle$, $(-10, -7)$

43. The vertices of a rectangle are $R(-5, -5)$, $S(-1, -5)$, $T(-1, 1)$, and $U(-5, 1)$. After translation, R' is the point $(0, -13)$. Find the translation vector and coordinates of U'.

a. $\langle -5, 8 \rangle$, $(-10, 9)$

b. $\langle 5, -8 \rangle$, $(0, -7)$

44. $P \rightarrow P'(-5, -8)$ for the glide vector $\langle 3, 5 \rangle$ and the reflection line $y = -x$. Find the coordinates of P.
   a. $(5, 0)$
   b. $(-5, 0)$
   c. $(11, 10)$
   d. $(-11, -10)$

45. The vertices of a triangle are $P(-2, -4)$, $Q(2, -5)$, and $R(-1, -8)$. Name the vertices of the image reflected in the y-axis.
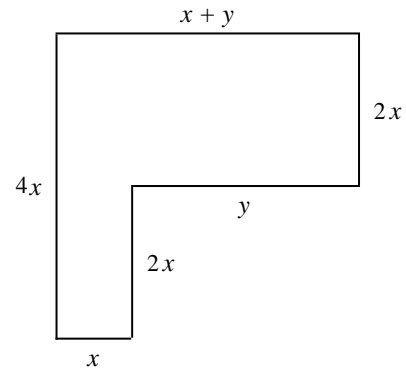   a. $P'(-2, -4)$, $Q'(2, -5)$, $R'(-1, -8)$
   b. $P'(-2, 4)$, $Q'(2, 5)$, $R'(-1, 8)$
   c. $P'(2, -4)$, $Q'(-2, -5)$, $R'(1, -8)$
   d. $P'(2, 4)$, $Q'(-2, 5)$, $R'(1, 8)$

46. Use vertex form to write the equation of the parabola.
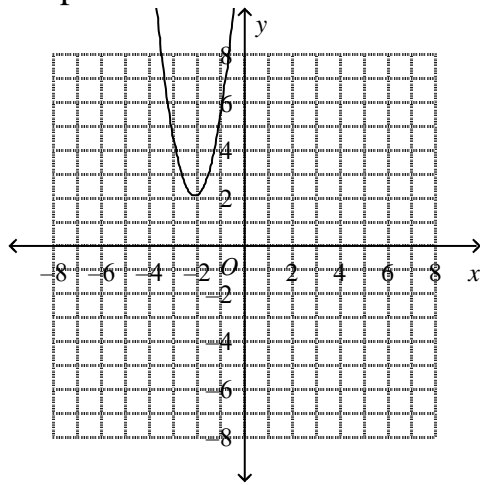
   a. $y = 3(x - 2)^2 + 2$
   b. $y = 3(x - 2)^2 - 2$
   c. $y = 3(x + 2)^2 + 2$
   d. $y = (x + 2)^2 + 2$

47. Find the perimeter of the figure. Simplify the answer.

   a. $9x + 2y$
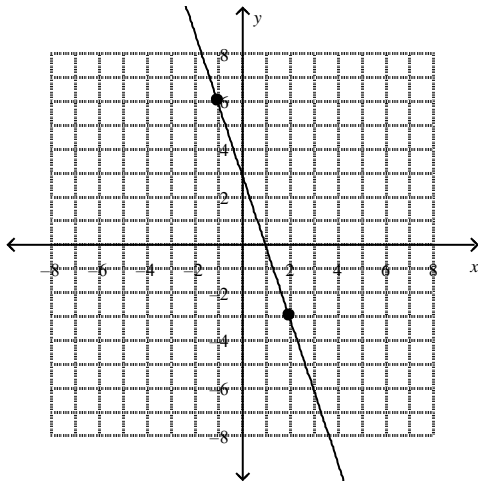   b. $10x + y$
   c. $10x + 2y$
   d. $9x + 3y$

48. Find the image of $O(-1, -3)$ after two reflections, first in the line $y = -2$, and then in the line $x = -2$.
   a. $(-3, -1)$
   b. $(-3, -5)$

c. $(-1, -3)$

d. $(-2, -2)$

c. $27\sqrt[3]{10x}$

d. not possible to simplify

49. The formula for the volume of a sphere is $V = \frac{4}{3}\pi r^3$. Find the radius, to the nearest hundredth, of a sphere with a volume of 15 in.^{3}.

   a. 3.58 in.

   b. 258.01 in.

   c. 1.53 in.

   d. 1.85 in.

50. Find the slope of the line.

   a. $1\frac{1}{3}$

   b. $-\frac{1}{3}$
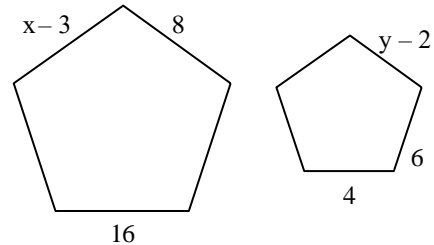
   c. -3

   d. 3

Add if possible.

51. $4\sqrt[3]{3x} + 5\sqrt[3]{10x}$

   a. $9\sqrt[3]{13x}$

   b. $27\sqrt[3]{3x}$

The polygons are similar, but not necessarily drawn to scale. Find the values of *x* and *y*.

52. The pentagons are regular.

   a. $x = 27$, $y = 4$

   b. $x = 27$, $y = 5$

   c. $x = 28$, $y = 5$

   d. $x = 28$, $y = 4$

53. The function $y = -16t^2 + 486$ models the height y in feet of a stone t seconds after it is dropped from the edge of a vertical cliff. How long will it take the stone to hit the ground? Round to the nearest hundredth of a second.

   a. 7.79 seconds

   b. 11.02 seconds

   c. 0.25 seconds

   d. 5.51 seconds

54. Identify the vertex and the y-intercept of the graph of the function $y = -3(x + 2)^2 + 5$.

   a. vertex: $(-2, 5)$;
      y-intercept: -7

   b. vertex: $(2, -5)$;

y-intercept: –12
c. vertex: (2, 5);
    y-intercept: –7
d. vertex: (–2, –5);
    y-intercept: 9

d. $y = |x + 2| - 1$

56. Write the exponential expression $3x^{\frac{3}{8}}$ in radical form.
a. $3\sqrt[8]{x^3}$
b. $\sqrt[8]{3x^3}$
c. $3\sqrt[3]{x^8}$
d. $3^{\frac{3}{8}}\sqrt[8]{x^3}$

55. Write the equation that is the translation of $y = |x|$ left 1 unit and up 2 units.
a. $y = |x - 2| - 1$
b. $y = |x + 1| + 2$
c. $y = |x - 1| + 2$

57. The vertices of a triangle are *P*(–3, 8), *Q*(–6, –4), and *R*(1, 1). Name the vertices of the image reflected in the *x*-axis.
a. $P'(3, 8), Q'(6, -4), R'(-1, 1)$
b. $P'(-3, 8), Q'(-6, -4), R'(1, 1)$
c. $P'(-3, -8), Q'(-6, 4), R'(1, -1)$
d. $P'(3, -8), Q'(6, 4), R'(-1, -1)$

58. Write an equation for the translation of $y = \dfrac{4}{x}$ that has the asymptotes $x = 7$ and $y = 6$.

a. $y = \dfrac{4}{x - 6} + 7$

b. $y = \dfrac{4}{x + 7} + 6$

c. $y = \dfrac{4}{x - 7} + 6$

d. $y = \dfrac{4}{x + 6} + 7$

Sketch the asymptotes and graph the function.
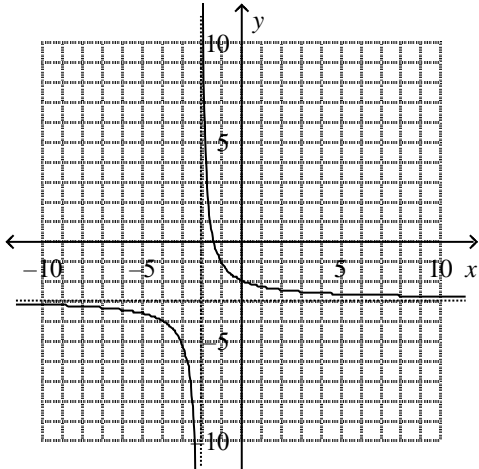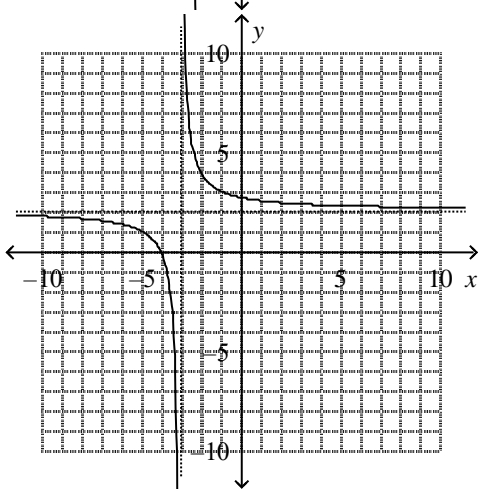
59. $y = \dfrac{2}{x + 2} - 3$

a.
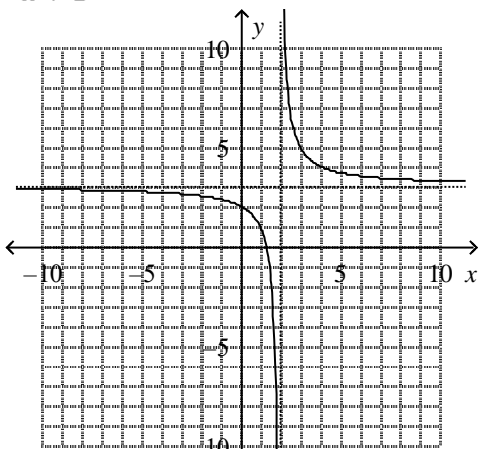
b.
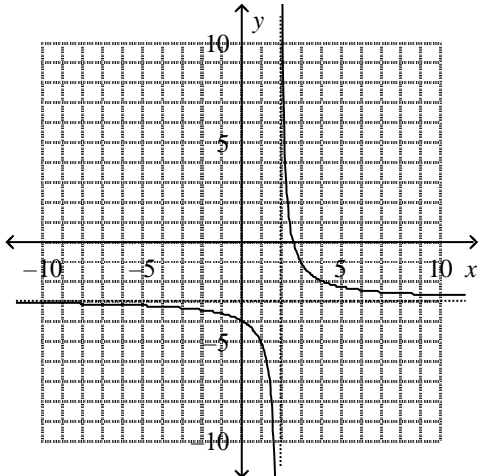
c.

d.

60. The right figure is an isometry of the left figure. Tell whether their orientations are the same or opposite. Then classify the isometry.

a. opposite orientation; reflection
b. opposite orientation; translation
c. same orientation; rotation
d. same orientation; glide reflection

Solve. Check for extraneous solutions.

61. $6x = \sqrt{24 + 12x}$

a. $-\dfrac{2}{3}$

b. -1

c. 1 and $-\dfrac{2}{3}$

d. 1

62. Simplify $\sqrt[3]{128a^{13}b^6}$. Assume that all variables are positive.
   a. $4a^4b^2\sqrt[3]{2a}$
   b. $2a^4b^2\sqrt[3]{4a}$
   c. $4a^4b^3\sqrt[3]{a}$
   d. none of these

63. Describe in words the translation represented by the vector $\langle 2, -1 \rangle$.
   a. 2 units to the right and 1 units down
   b. 1 units to the right and 2 units down
   c. 2 units to the left and 1 units down
   d. 2 units to the left and 1 units up

64. Compare the graphs of the pair of functions. Describe how the graph of the second function relates to the graph of the first function.
   $y = -2|x|$ and $y = -2|x| - 3$
   a. The second function is the graph of
      $y = -2|x|$ moved to the right 3 units.
   b. The second function is the graph of
      $y = -2|x|$ moved up 3 units.
   c. The second function is the graph of
      $y = -2|x|$ moved to the left 3 units.
   d. The second function is the graph of
      $y = -2|x|$ moved down 3 units.

Graph the inequality.
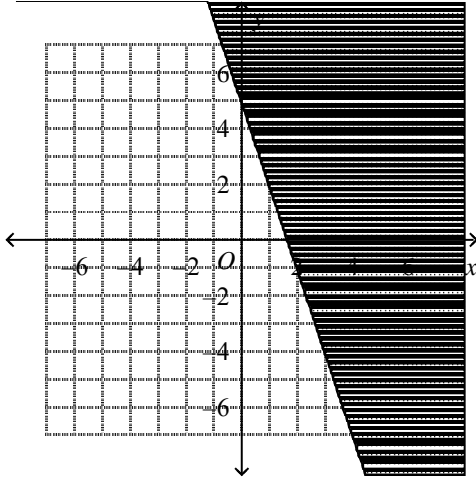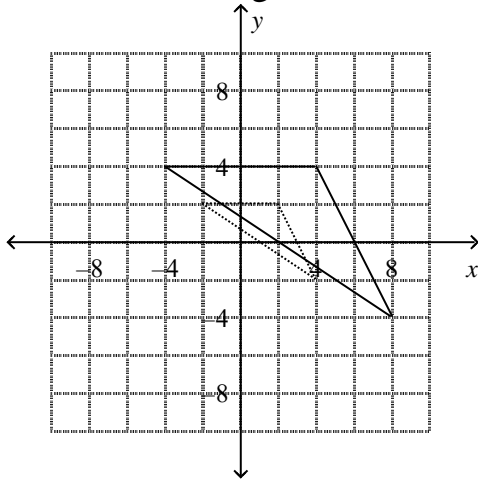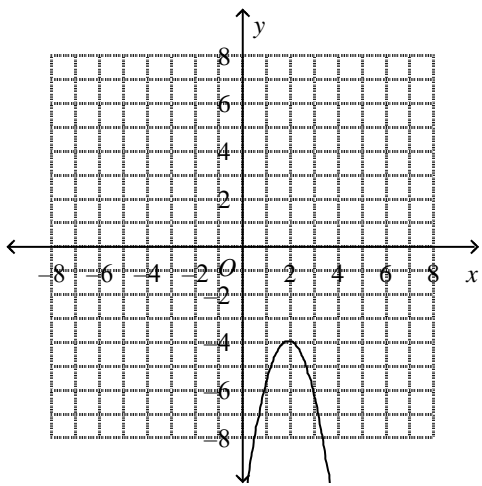
65. $-3x + y \le 5$

a.
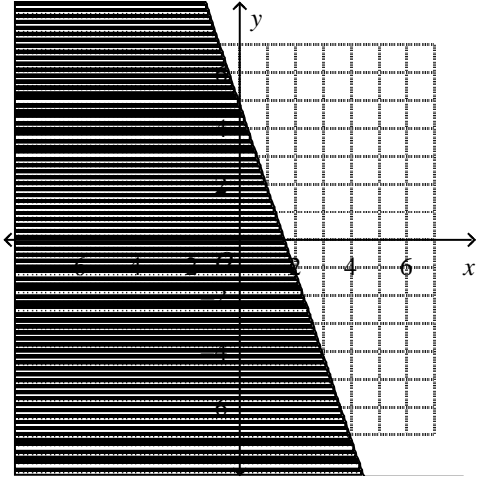
b.
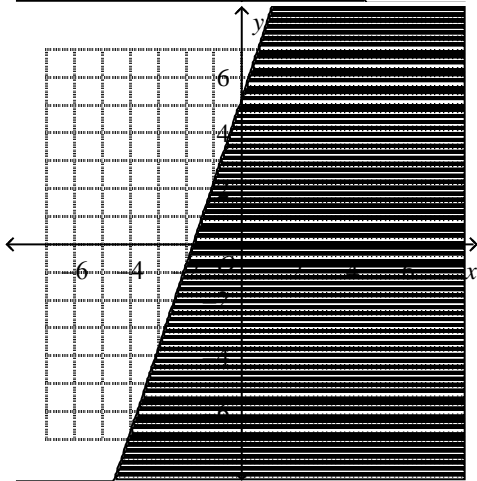
c.
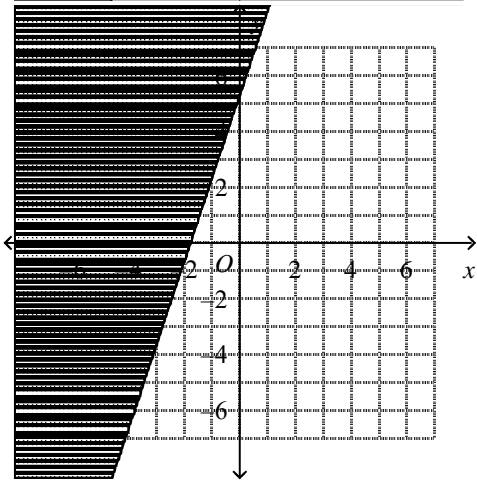
d.

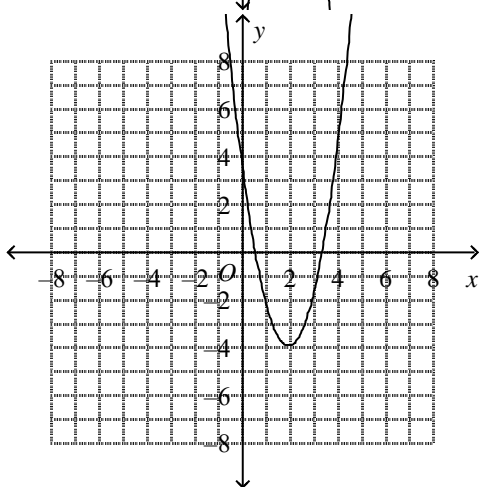66. The dashed triangle is a dilation image of the solid triangle. What is the scale factor?

a. $\dfrac{1}{4}$

b. $\dfrac{1}{2}$

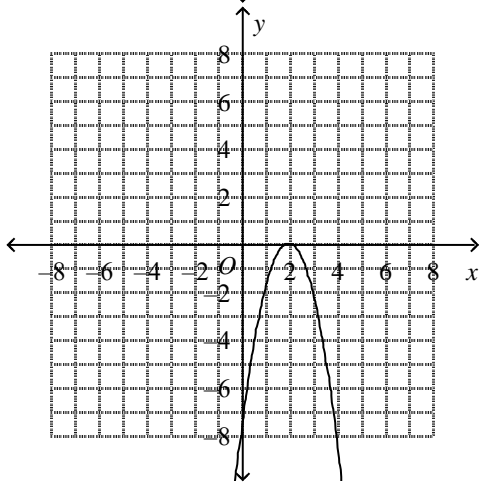c. $\dfrac{2}{3}$

d. 2

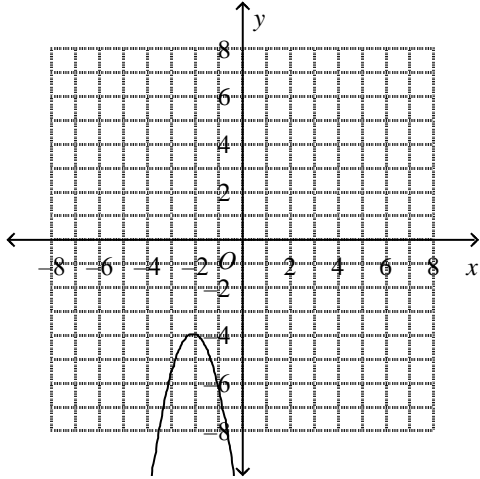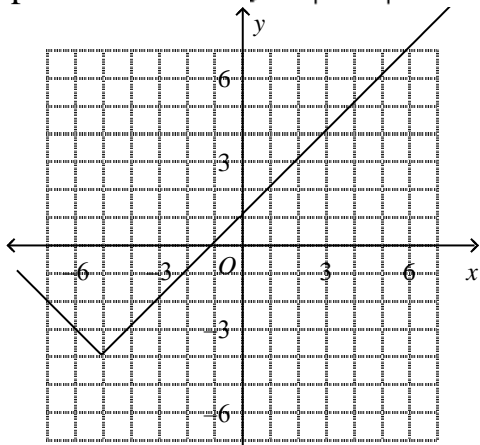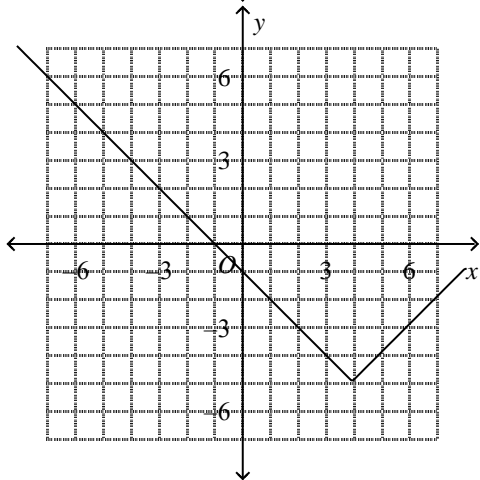67. Which is the graph of $y = -2(x - 2)^2 - 4$?
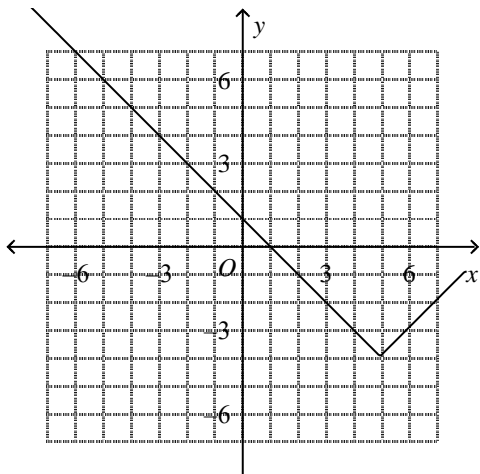
a.

b.

c.

d.

68. Graph the function $y = |x - 5| - 4$.

a.

b.

c.

d.