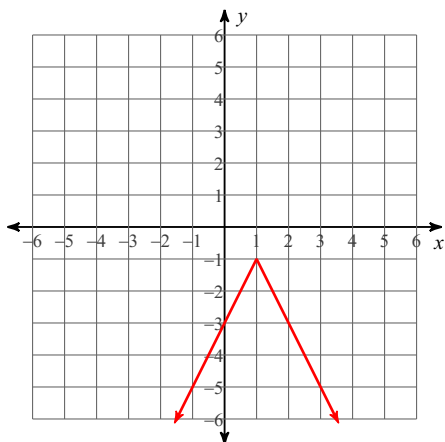


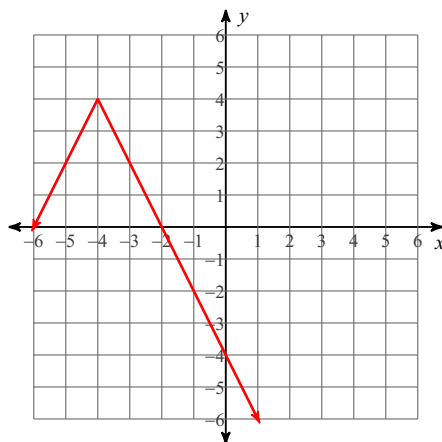
## AG2 Pre-Comp Common Study Guide

**Graph each translated equation.**

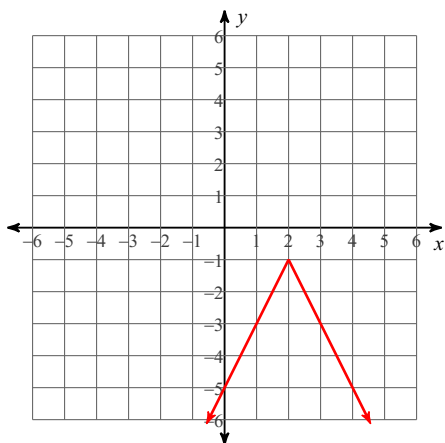
1)  $y = -2|x - 1| - 1$



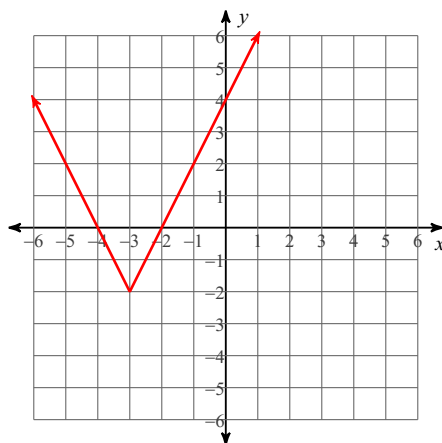
2)  $y = -2|x + 4| + 4$



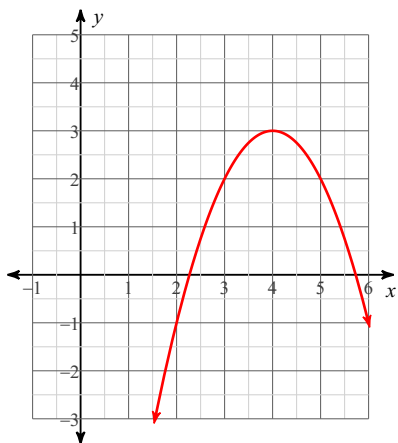
3)  $y = -2|x - 2| - 1$



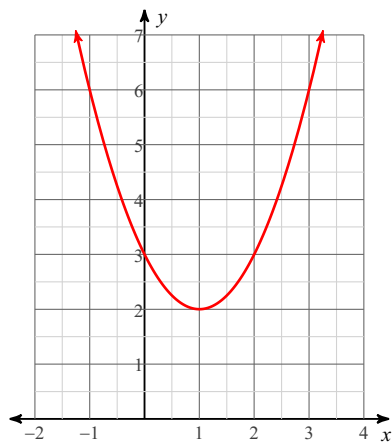
4)  $y = 2|x + 3| - 2$



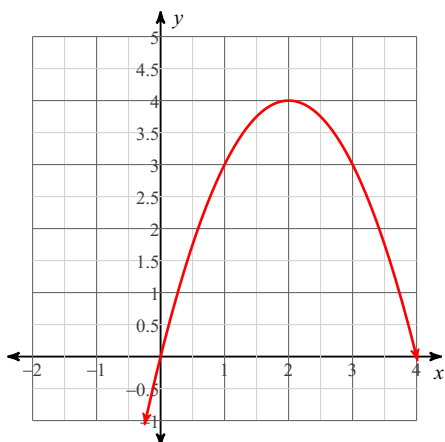
5)  $f(x) = -(x - 4)^2 + 3$



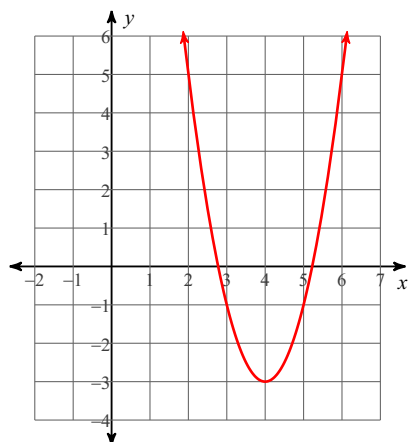
6)  $f(x) = (x - 1)^2 + 2$



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



8)  $f(x) = 2(x - 4)^2 - 3$



**Find the explicit formula and the recursive formula for the arithmetic sequence..**

9)  $-4, 0, 4, 8, \dots$

Explicit:  $a_n = -8 + 4n$

Recursive:  $a_n = a_{n-1} + 4$   
 $a_1 = -4$

10)  $19, 17, 15, 13, \dots$

Explicit:  $a_n = 21 - 2n$

Recursive:  $a_n = a_{n-1} - 2$   
 $a_1 = 19$

11)  $4, 10, 16, 22, \dots$

Explicit:  $a_n = -2 + 6n$

Recursive:  $a_n = a_{n-1} + 6$   
 $a_1 = 4$

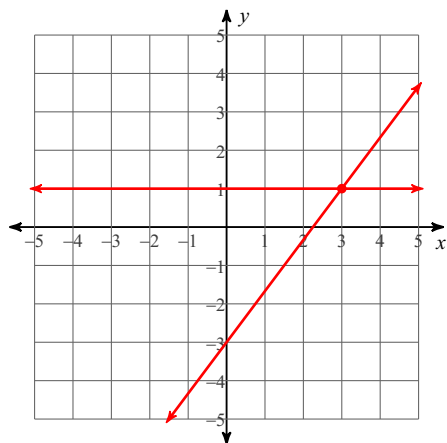
12)  $10, 5, 0, -5, \dots$

Explicit:  $a_n = 15 - 5n$

Recursive:  $a_n = a_{n-1} - 5$   
 $a_1 = 10$

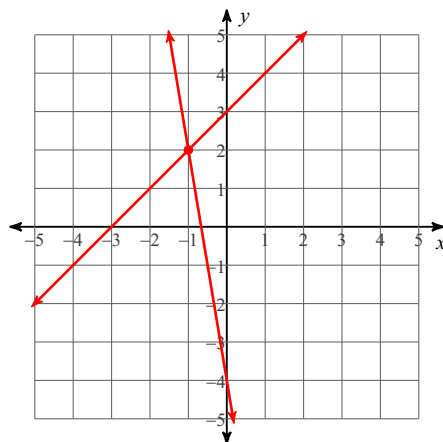
Solve each system of equations by graphing.

13)  $y = \frac{4}{3}x - 3$   
 $y = 1$



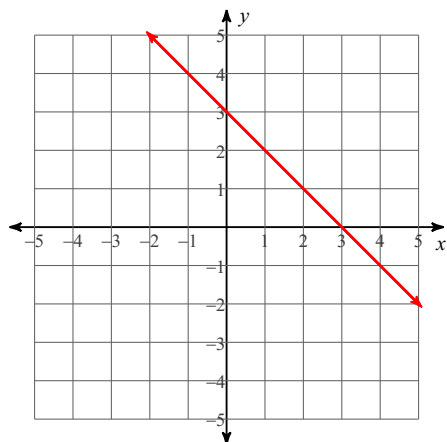
(3, 1)

14)  $y = x + 3$   
 $y = -6x - 4$



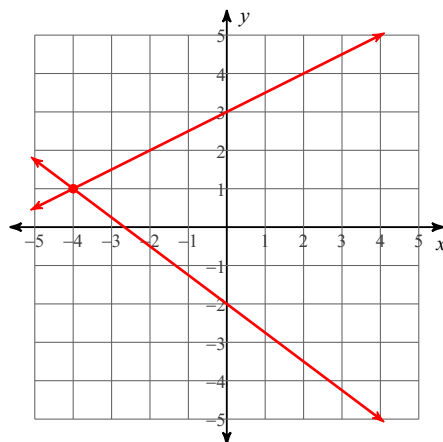
(-1, 2)

15)  $-y - x = -3$   
 $x = 3 - y$



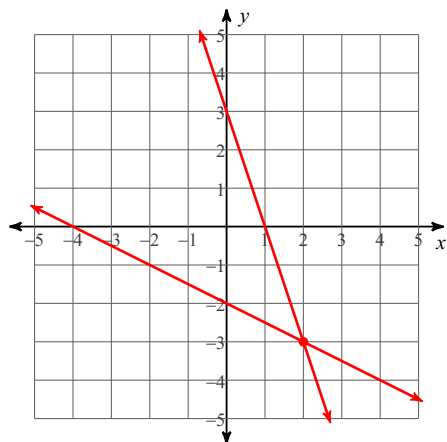
Infinite number of solutions

16)  $0 = 2y - x - 6$   
 $8 + 4y = -3x$



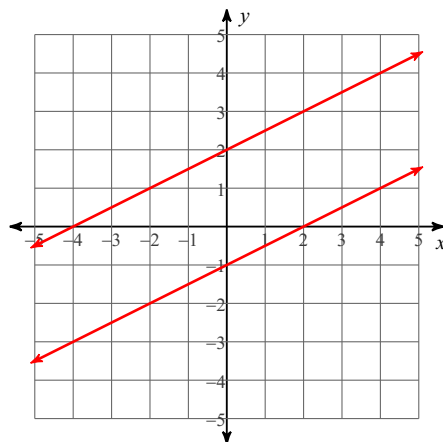
(-4, 1)

$$17) \begin{aligned} -x - 2y &= 4 \\ 3x &= 3 - y \end{aligned}$$



$(2, -3)$

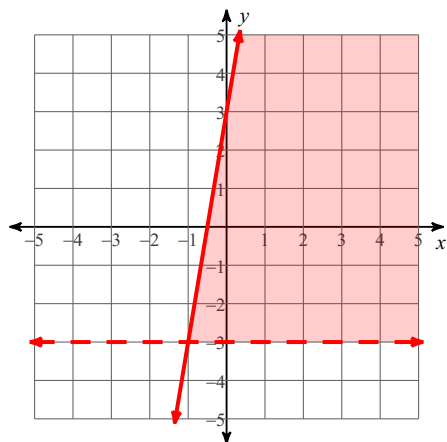
$$18) \begin{aligned} 0 &= -4 - x + 2y \\ 2 + 2y - x &= 0 \end{aligned}$$



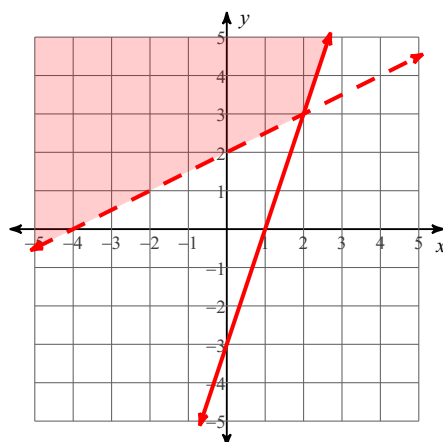
No solution

Sketch the graph of the set of all points that solve each system of linear inequalities.

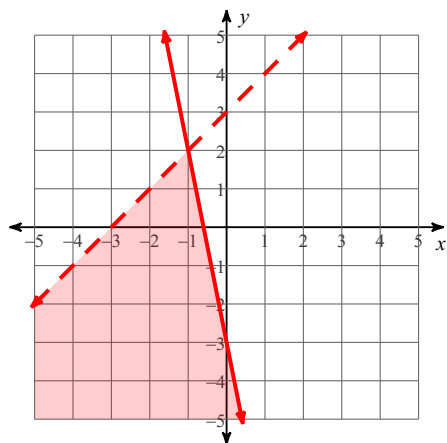
$$19) \begin{aligned} y &\leq 6x + 3 \\ y &> -3 \end{aligned}$$



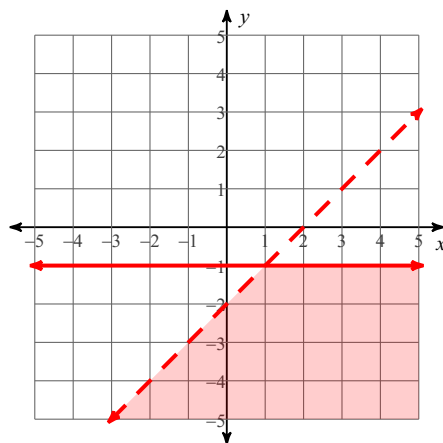
$$20) \begin{aligned} y &\geq 3x - 3 \\ y &> \frac{1}{2}x + 2 \end{aligned}$$



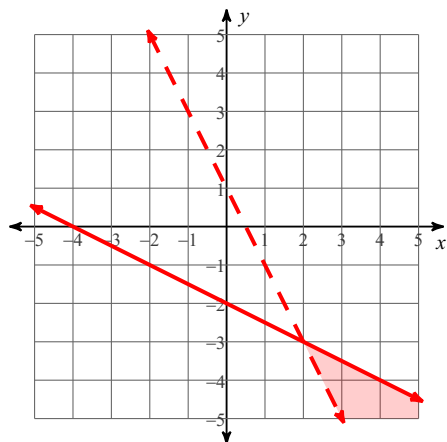
$$21) \begin{aligned} y &< x + 3 \\ y &\leq -5x - 3 \end{aligned}$$



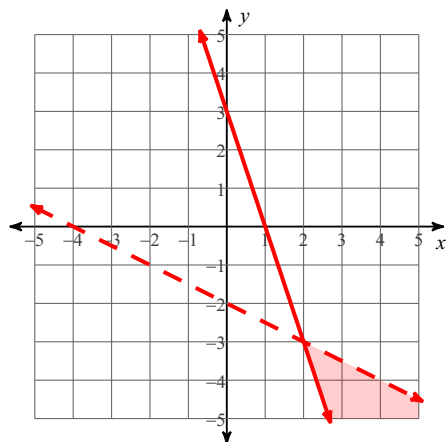
$$22) \begin{aligned} y &\leq -1 \\ x - y &> 2 \end{aligned}$$



23)  $2x + y > 1$   
 $x + 2y \leq -4$



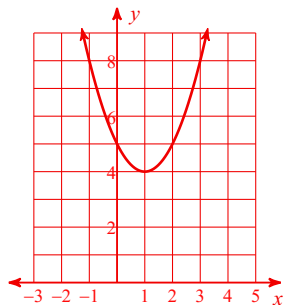
24)  $3x + y \geq 3$   
 $x + 2y < -4$



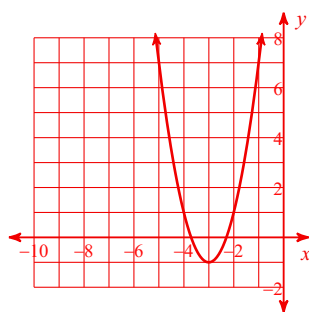
**Find the key features of each quadratic function: the vertex, domain, range, axis of symmetry, and the y-intercept.**

**\*See the Answer Supplement for the answers to 25-36\***

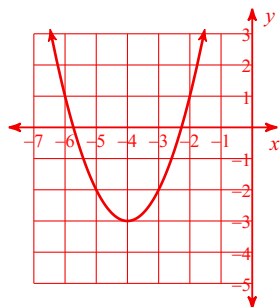
25)  $f(x) = (x - 1)^2 + 4$



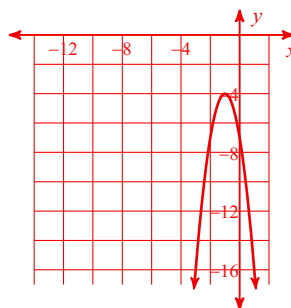
26)  $f(x) = 2(x + 3)^2 - 1$



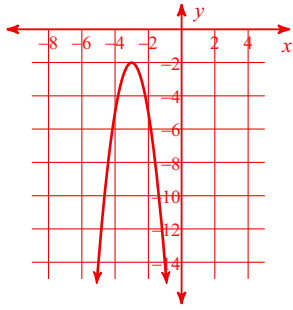
27)  $f(x) = x^2 + 8x + 13$



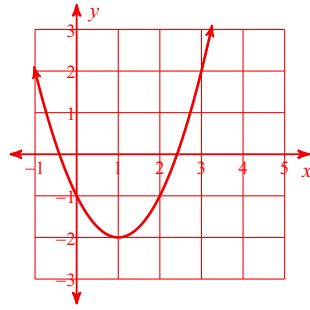
28)  $f(x) = -3x^2 - 6x - 7$



$$29) f(x) = -3(x+3)^2 - 2$$



$$30) f(x) = (x-1)^2 - 2$$



$$31) f(x) = x^2 + 2x - 3$$

Vertex:  $(-1, -4)$

Axis of Sym.:  $x = -1$

$$32) f(x) = -(x-5)^2$$

Vertex:  $(5, 0)$

Axis of Sym.:  $x = 5$

$$33) f(x) = -x^2 + 3$$

Vertex:  $(0, 3)$

Axis of Sym.:  $x = 0$

$$34) f(x) = (x-4)^2 - 4$$

Vertex:  $(4, -4)$

Axis of Sym.:  $x = 4$

$$35) f(x) = -3x^2 - 6x + 3$$

Vertex:  $(-1, 6)$

Axis of Sym.:  $x = -1$

$$36) f(x) = x^2 - 4x + 11$$

Vertex:  $(2, 7)$

Axis of Sym.:  $x = 2$

**Solve each quadratic equation by any method.**

$$37) n^2 + 7n - 60 = 0$$

$\{5, -12\}$

$$38) x^2 - 3x - 70 = 0$$

$\{-7, 10\}$

$$39) 2k^2 - 15k + 27 = 2$$

$\left\{\frac{5}{2}, 5\right\}$

$$40) 20x^2 - 16x - 5 = -5$$

$\left\{\frac{4}{5}, 0\right\}$

$$41) x^2 = -10x$$

$\{-10, 0\}$

$$42) v^2 - 3v = 28$$

$\{7, -4\}$

$$43) -3n^2 = 18$$

$\{i\sqrt{6}, -i\sqrt{6}\}$

$$44) v^2 + 6 = 46$$

$\{2\sqrt{10}, -2\sqrt{10}\}$

$$45) x^2 - 10x + 5 = 0$$

$\{5 + 2\sqrt{5}, 5 - 2\sqrt{5}\}$

$$46) n^2 - 12n + 26 = 0$$

$\{6 + \sqrt{10}, 6 - \sqrt{10}\}$

## Quadratic Applications

- 47) A soccer ball is kicked across the field. The height of the ball is modeled by the equation:  
 $h(t) = -16t^2 + 32t + 20$ , where  $t$  is time in seconds.

A. What is the maximum height the ball reaches?

B. How many seconds after it leaves the ground does it reach its maximum height?

C. How long does it take for the ball to hit the ground?

A. 36 feet

B. 1 second

C.  $\frac{5}{2}$  seconds = 2.5 seconds

- 49) You are sightseeing on the top of a 120 foot tall building, when your little brother throws his favorite stuffed animal off the top to watch it fly. The height of the stuffy after take-off is modeled by the equation:  
 $h(t) = -t^2 + 4t + 120$ , where  $t$  is time in seconds.

A. What is the maximum height the stuffy reaches? Does it go higher than the top of the building?

B. How long does it take for the stuffy to hit the ground?

C. How long does it take for you to calm your brother once he realizes his stuffy cannot fly?

A. 124 feet; Yes.

B.  $2 + 2\sqrt{31}$  seconds = 13.136 seconds

C. Hopefully not that long! Ha!  
Well, I hope you smiled!  
Just a little reminder that you're doing great!  
Give yourself a pat on the back!  
You've got this!

- 48) A volleyball is served across the net and its height, in feet, is modeled by the equation:  
 $h(t) = -2t^2 + 4t + 10$ , where  $t$  is time in seconds.

A. What is the maximum height the volleyball reaches? Does it go over the net?

B. The other team misses the ball and it hits the ground. How long does it take for the ball to hit the ground?

A. 12 feet; Yes.

B.  $1 + \sqrt{6}$  seconds = 3.449 seconds

- 50) A toy rocket is launched up into the air and the maximum height it reaches is 550 feet. The height of the rocket is modeled by the equation:  
 $h(t) = -t^2 + 20t + 450$ , where  $t$  is time in seconds.

A. How long does it take for the rocket to reach 550 feet?

What is the total flight time of the rocket?

A. 10 seconds

B.  $10 + 5\sqrt{22}$  seconds = 33.452 seconds

**Add or subtract.**

$$51) (2m^2 + 5m^2n) - (4m^2 - 4m^2n) \\ 9m^2n - 2m^2$$

$$52) (6x^2 + 6) - (5x^2 - 2) \\ x^2 + 8$$

$$53) (8x^2y - 4) - (4xy + 1 - x^2y) \\ 9x^2y - 4xy - 5$$

$$54) (2 - 4x^3y^3) + (8x^3y^3 - 7 - 5x^3) \\ 4x^3y^3 - 5x^3 - 5$$

$$55) (m + 4mn^3 + 5m^3n^2) - (7m - 8m^3n^2 + 3mn^3) \\ 13m^3n^2 + mn^3 - 6m$$

$$56) (5uv^2 - 5uv^4 - 5uv^3) + (2uv^4 + 4uv^3 + 8uv^2) \\ -3uv^4 - uv^3 + 13uv^2$$

**Find each product.**

$$57) (2x + 3)(6x - 7) \\ 12x^2 + 4x - 21$$

$$58) (4r - 2)(8r - 4) \\ 32r^2 - 32r + 8$$

$$59) (5b - 5)(8b^2 + 8b - 2) \\ 40b^3 - 50b + 10$$

$$60) (3r + 7)(6r^2 + 7r - 7) \\ 18r^3 + 63r^2 + 28r - 49$$

$$61) (x + 2)(x + 3)(x + 4) \\ x^3 + 9x^2 + 26x + 24$$

$$62) (x + 1)^3 \\ x^3 + 3x^2 + 3x + 1$$

**Factor using special identities.**

$$63) 25a^4 - 36b^2 \\ (5a^2 - 6b)(5a^2 + 6b)$$

$$64) 8x^3 - 125 \\ (2x - 5)(4x^2 + 10x + 25)$$

$$65) x^2 + 10x + 25 \\ (x + 5)^2$$

$$66) 64p^2 - 49q^2 \\ (8p - 7q)(8p + 7q)$$

$$67) 125x^3 - 64 \\ (5x - 4)(25x^2 + 20x + 16)$$

$$68) x^3 - 1 \\ (1 - x)(1 + x + x^2)$$

Use any method to divide.

69)  $(x^4 + 10x^3 + 5) \div (x + 10)$

$$x^3 + \frac{5}{x+10}$$

70)  $(n^3 + 14n^2 + 37n - 81) \div (n + 9)$

$$n^2 + 5n - 8 - \frac{9}{n+9}$$

71)  $(x^4 + 14x^3 + 43x^2 - 38x + 6) \div (x + 8)$

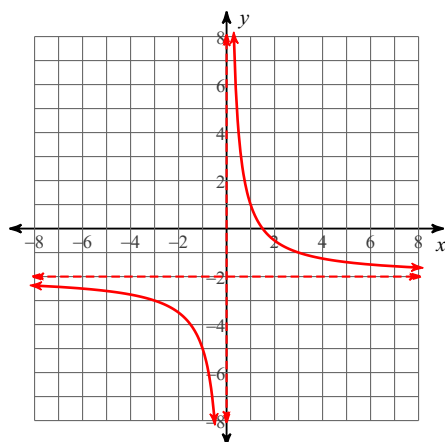
$$x^3 + 6x^2 - 5x + 2 - \frac{10}{x+8}$$

72)  $(9n^3 - 87n^2 + 50n + 33) \div (n - 9)$

$$9n^2 - 6n - 4 - \frac{3}{n-9}$$

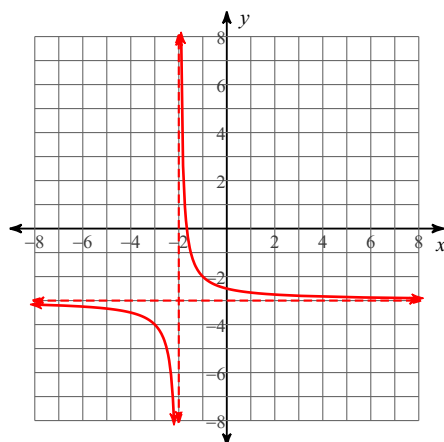
Identify the vertical asymptote(s) and horizontal asymptote of each. Then sketch the graph.

73)  $f(x) = \frac{3}{x} - 2$



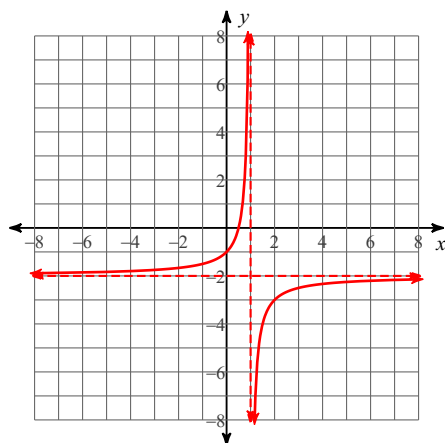
Vertical Asym.:  $x = 0$   
Horz. Asym.:  $y = -2$

74)  $f(x) = \frac{1}{x+2} - 3$



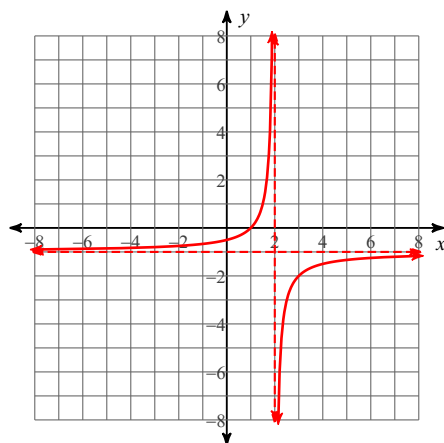
Vertical Asym.:  $x = -2$   
Horz. Asym.:  $y = -3$

75)  $f(x) = -\frac{1}{x-1} - 2$



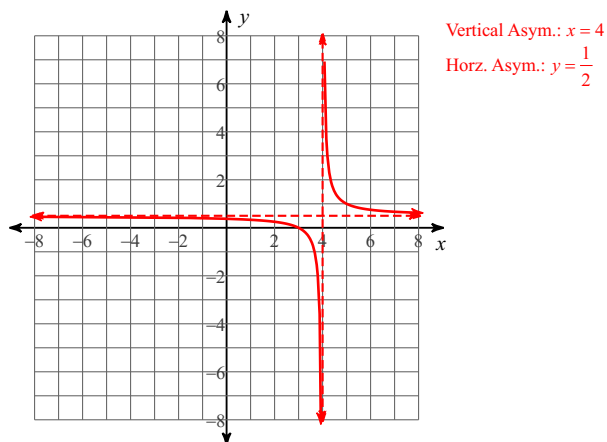
Vertical Asym.:  $x = 1$   
Horz. Asym.:  $y = -2$

76)  $f(x) = \frac{-x+1}{x-2}$



Vertical Asym.:  $x = 2$   
Horz. Asym.:  $y = -1$

$$77) f(x) = \frac{x-3}{2x-8}$$



**Multiply or divide and then simplify completely. State the values excluded from the domain.**

$$78) \frac{12x-4}{2x} \cdot \frac{2x}{1-3x}$$

$$-4; x \neq 0; x \neq \frac{1}{3}$$

$$79) \frac{2x^2 + x - 6}{5} \cdot \frac{1}{2x-3}$$

$$\frac{x+2}{5}; x \neq \frac{3}{2}$$

$$80) \frac{\frac{3}{3b+12}}{\frac{b+3}{b+5}}$$

$$\frac{b+5}{(b+4)(b+3)}; b \neq -4, b \neq -5, b \neq -3$$

$$81) \frac{2m^2}{8m-20} \div \frac{3}{6m-15}$$

$$\frac{m^2}{2}; m \neq \frac{5}{2}$$

$$82) \frac{1}{n-2} \cdot \frac{3n^2+8n+4}{3n+2}$$

$$\frac{n+2}{n-2}; n \neq 2, n \neq -\frac{2}{3}$$

$$83) \frac{3}{20b-8} \div \frac{3}{8-18b-5b^2}$$

$$\frac{-4-b}{4}; b \neq \frac{2}{5}, b \neq -4\}$$

**Add or subtract then simplify completely.**

$$84) \frac{2}{3k^2+16k+5} + 5k$$

$$\frac{15k^3+80k^2+25k+2}{(k+5)(3k+1)}$$

$$85) \frac{7}{2v+8} - \frac{7v}{3v}$$

$$\frac{-35-14v}{6(v+4)}$$

$$86) \frac{4}{3b} - \frac{7b}{3b^2 - 6b}$$

$$\frac{-3b - 8}{3b(b - 2)}$$

$$87) \frac{4}{x - 3} - \frac{2}{8}$$

$$\frac{19 - x}{4(x - 3)}$$

$$88) \frac{8b}{8} - \frac{b - 8}{b - 4}$$

$$\frac{b^2 - 5b + 8}{b - 4}$$

$$89) \frac{x + 2y}{12x^4} + \frac{x + 4y}{12x^4}$$

$$\frac{x + 3y}{6x^4}$$

**Solve each rational equation.**

$$90) \frac{5}{3 - x} = 1$$

$$x = -2$$

$$91) \frac{6}{x + 3} = 3$$

$$x = -1$$

$$92) \frac{1600}{400 + p} = \frac{1200}{400 - p}$$

$$p = 40$$

$$93) \frac{4}{x - 3} - 1 = \frac{3}{x - 3}$$

$$x = 4$$

$$94) \frac{x}{x + 2} + \frac{3}{x + 3} = \frac{1}{x^2 + 5x + 6}$$

$$x = -1; x = 5$$

$$95) \frac{72}{b + 24} = \frac{48}{b - 24}$$

$$b = 120$$

**Simplify each radical expression. Assume all variables are positive.**

$$96) -\sqrt[3]{128a^3bc}$$

$$-4a\sqrt[3]{2bc}$$

$$97) 2\sqrt[3]{128x^3y^4z^2}$$

$$8xy\sqrt[3]{2yz^2}$$

$$98) 3\sqrt{27x}$$

$$9\sqrt{3x}$$

$$99) -4\sqrt[5]{64a^6}$$

$$-8a\sqrt[5]{2a}$$

$$100) -\sqrt[4]{48x^5}$$

$$-2x\sqrt[4]{3x}$$

$$101) -4\sqrt[4]{162x^6}$$

$$-12x\sqrt[4]{2x^2}$$

**Solve each radical equation. Exclude any extraneous solutions.**

$$102) \ x = \sqrt{x + 12}$$

$$x = 4$$

$$103) \ x = \sqrt{2x + 3}$$

$$x = 3$$

$$104) \ x = \sqrt{5x - 4}$$

$$x = 1, 4$$

$$105) \ \sqrt{x + 7} = x - 1$$

$$x = \frac{3 + \sqrt{33}}{2}$$

$$106) \ \sqrt{3x + 4} = \sqrt{x + 10}$$

$$x = 3$$

$$107) \ \sqrt{2x + 5} = x + 1$$

$$x = 2$$

**Perform the indicated operation.**

$$108) \ g(a) = a - 3$$

$$f(a) = a^2 + 5a$$

$$\text{Find } \left(\frac{g}{f}\right)(-6)$$

$$\left(\frac{g}{f}\right)(-6) = -\frac{3}{2}$$

$$109) \ h(t) = t^2 - 4t$$

$$g(t) = 3t + 2$$

$$\text{Find } (h \cdot g)(5)$$

$$(h \cdot g)(5) = 85$$

$$110) \ g(x) = 2x + 2$$

$$f(x) = x^3 + x^2$$

$$\text{Find } (g + f)(-4)$$

$$(g + f)(-4) = -54$$

$$111) \ g(t) = t^3 + 5t^2$$

$$h(t) = -2t + 1$$

$$\text{Find } (g + h)(-1)$$

$$(g + h)(-1) = 7$$

$$112) \ h(x) = 3x + 4$$

$$g(x) = -x^2 + 3 - 2x$$

$$\text{Find } (h \circ g)(3)$$

$$(h \circ g)(3) = -32$$

$$113) \ g(t) = 3t - 1$$

$$f(t) = 3t - 4$$

$$\text{Find } (g \circ f)(0)$$

$$(g \circ f)(0) = -13$$

$$114) \ f(t) = 2t + 4$$

$$\text{Find } (f \circ f)(-1)$$

$$(f \circ f)(-1) = 8$$

$$115) \ g(x) = 2x - 3$$

$$f(x) = x^3 - 5x^2$$

$$\text{Find } (g \circ f)(7)$$

$$(g \circ f)(7) = 193$$

**Find the inverse of each function.**

$$116) f(x) = -x$$

$$f^{-1}(x) = -x$$

$$117) f(x) = \frac{-12 - x}{3}$$

$$f^{-1}(x) = -3x - 12$$

$$118) f(x) = \frac{3}{7}x + \frac{6}{7}$$

$$f^{-1}(x) = -2 + \frac{7}{3}x$$

$$119) h(x) = \sqrt[3]{x} - 1$$

$$h^{-1}(x) = (x + 1)^3$$

$$120) g(x) = \frac{2}{x - 1} - 1$$

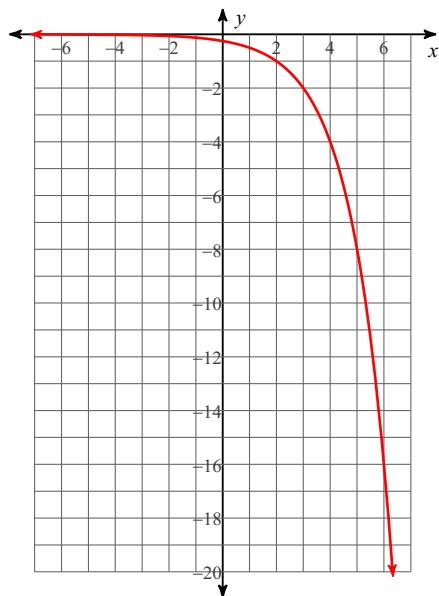
$$g^{-1}(x) = \frac{2}{x + 1} + 1$$

$$121) f(x) = 1 + (x + 2)^5$$

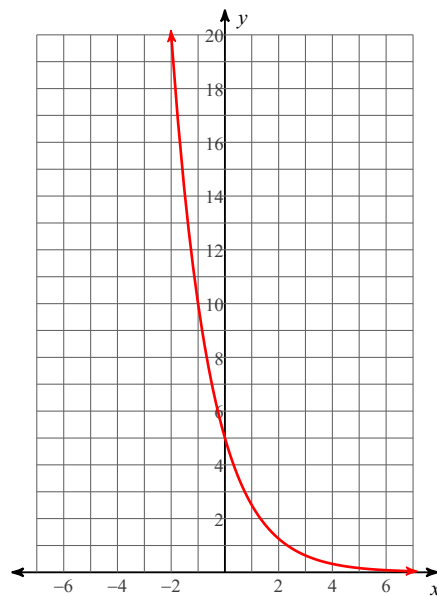
$$f^{-1}(x) = \sqrt[5]{x - 1} - 2$$

**Sketch the graph of each exponential function.**

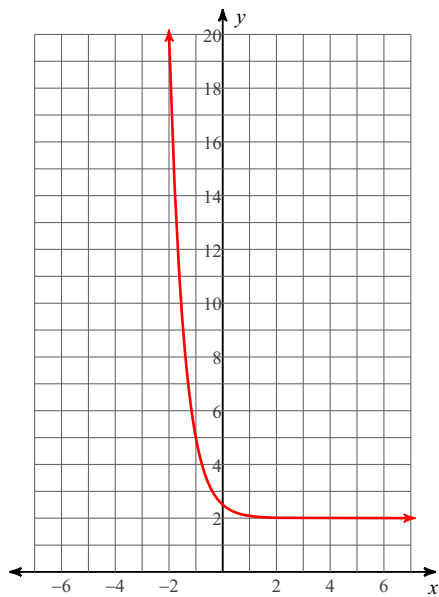
$$122) f(x) = -\frac{1}{4} \cdot 2^x$$



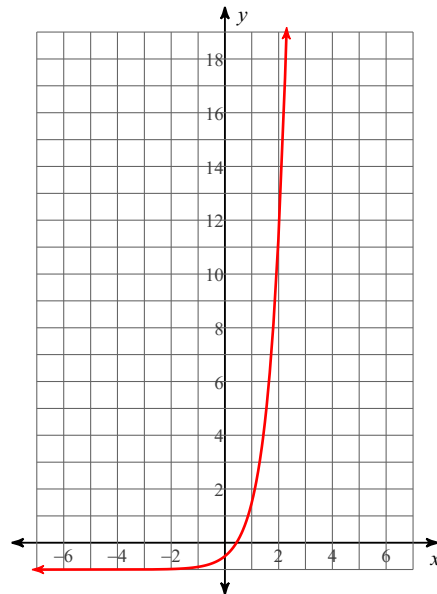
$$123) f(x) = 5 \cdot \left(\frac{1}{2}\right)^x$$



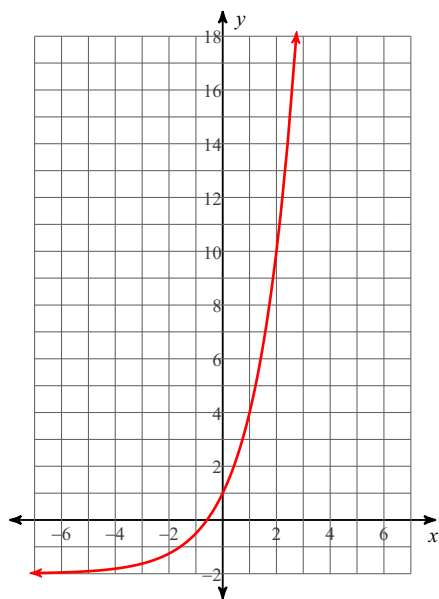
124)  $f(x) = \frac{1}{2} \cdot \left(\frac{1}{6}\right)^x + 2$



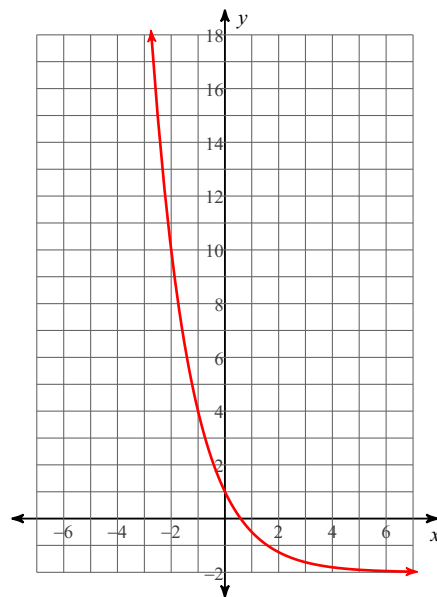
125)  $f(x) = \frac{1}{2} \cdot 5^x - 1$



126)  $f(x) = 3 \cdot 2^x - 2$



127)  $f(x) = 3 \cdot \left(\frac{1}{2}\right)^x - 2$



Use the properties of logarithms to write the expression as a single logarithm.

$$128) \log_5 c + \frac{\log_5 a}{2} + \frac{\log_5 b}{2}$$
$$\log_5 (c\sqrt{ba})$$

$$129) 6\log_9 3 + 5\log_9 2$$
$$\log_9 (2^5 \cdot 3^6)$$

$$130) 3\log_9 a + 18\log_9 b$$
$$\log_9 (b^{18}a^3)$$

$$131) 5\log_9 a - 2\log_9 b$$
$$\log_9 \frac{a^5}{b^2}$$

$$132) 8\log_9 x + 4\log_9 y$$
$$\log_9 (y^4x^8)$$

$$133) 12\log_8 12 - 2\log_8 7$$
$$\log_8 \frac{12^{12}}{7^2}$$

# ANSWER SUPPLEMENT

|                                                                                                                                                                                                                                                                                                                              |                     |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------|--------|---------------------|-------|-----------------|------------------|----------|-------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------|--------|---------------------|-------|-----------------|------------------|----------|-------------|----------|
| <b>25.</b><br><table border="1"> <tr><td>Vertex</td><td>(1, 4)</td></tr> <tr><td>Domain</td><td><math>(-\infty, \infty)</math></td></tr> <tr><td>Range</td><td><math>(4, \infty)</math></td></tr> <tr><td>Axis of symmetry</td><td><math>x = 1</math></td></tr> <tr><td>y-intercept</td><td>(0, 5)</td></tr> </table>        | Vertex              | (1, 4)   | Domain | $(-\infty, \infty)$ | Range | $(4, \infty)$   | Axis of symmetry | $x = 1$  | y-intercept | (0, 5)   | <b>26.</b><br><table border="1"> <tr><td>Vertex</td><td>(-3, -1)</td></tr> <tr><td>Domain</td><td><math>(-\infty, \infty)</math></td></tr> <tr><td>Range</td><td><math>(-1, \infty)</math></td></tr> <tr><td>Axis of symmetry</td><td><math>x = -3</math></td></tr> <tr><td>y-intercept</td><td>(0, 17)</td></tr> </table>  | Vertex | (-3, -1) | Domain | $(-\infty, \infty)$ | Range | $(-1, \infty)$  | Axis of symmetry | $x = -3$ | y-intercept | (0, 17)  |
| Vertex                                                                                                                                                                                                                                                                                                                       | (1, 4)              |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Domain                                                                                                                                                                                                                                                                                                                       | $(-\infty, \infty)$ |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Range                                                                                                                                                                                                                                                                                                                        | $(4, \infty)$       |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Axis of symmetry                                                                                                                                                                                                                                                                                                             | $x = 1$             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| y-intercept                                                                                                                                                                                                                                                                                                                  | (0, 5)              |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Vertex                                                                                                                                                                                                                                                                                                                       | (-3, -1)            |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Domain                                                                                                                                                                                                                                                                                                                       | $(-\infty, \infty)$ |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Range                                                                                                                                                                                                                                                                                                                        | $(-1, \infty)$      |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Axis of symmetry                                                                                                                                                                                                                                                                                                             | $x = -3$            |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| y-intercept                                                                                                                                                                                                                                                                                                                  | (0, 17)             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| <b>27.</b><br><table border="1"> <tr><td>Vertex</td><td>(-4, -3)</td></tr> <tr><td>Domain</td><td><math>(-\infty, \infty)</math></td></tr> <tr><td>Range</td><td><math>(-3, \infty)</math></td></tr> <tr><td>Axis of symmetry</td><td><math>x = -4</math></td></tr> <tr><td>y-intercept</td><td>(0, 13)</td></tr> </table>   | Vertex              | (-4, -3) | Domain | $(-\infty, \infty)$ | Range | $(-3, \infty)$  | Axis of symmetry | $x = -4$ | y-intercept | (0, 13)  | <b>28.</b><br><table border="1"> <tr><td>Vertex</td><td>(-1, -4)</td></tr> <tr><td>Domain</td><td><math>(-\infty, \infty)</math></td></tr> <tr><td>Range</td><td><math>(-\infty, -4)</math></td></tr> <tr><td>Axis of symmetry</td><td><math>x = -1</math></td></tr> <tr><td>y-intercept</td><td>(0, -7)</td></tr> </table> | Vertex | (-1, -4) | Domain | $(-\infty, \infty)$ | Range | $(-\infty, -4)$ | Axis of symmetry | $x = -1$ | y-intercept | (0, -7)  |
| Vertex                                                                                                                                                                                                                                                                                                                       | (-4, -3)            |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Domain                                                                                                                                                                                                                                                                                                                       | $(-\infty, \infty)$ |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Range                                                                                                                                                                                                                                                                                                                        | $(-3, \infty)$      |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Axis of symmetry                                                                                                                                                                                                                                                                                                             | $x = -4$            |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| y-intercept                                                                                                                                                                                                                                                                                                                  | (0, 13)             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Vertex                                                                                                                                                                                                                                                                                                                       | (-1, -4)            |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Domain                                                                                                                                                                                                                                                                                                                       | $(-\infty, \infty)$ |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Range                                                                                                                                                                                                                                                                                                                        | $(-\infty, -4)$     |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Axis of symmetry                                                                                                                                                                                                                                                                                                             | $x = -1$            |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| y-intercept                                                                                                                                                                                                                                                                                                                  | (0, -7)             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| <b>29.</b><br><table border="1"> <tr><td>Vertex</td><td>(-3, -2)</td></tr> <tr><td>Domain</td><td><math>(-\infty, \infty)</math></td></tr> <tr><td>Range</td><td><math>(-\infty, -2)</math></td></tr> <tr><td>Axis of symmetry</td><td><math>x = -3</math></td></tr> <tr><td>y-intercept</td><td>(0, -29)</td></tr> </table> | Vertex              | (-3, -2) | Domain | $(-\infty, \infty)$ | Range | $(-\infty, -2)$ | Axis of symmetry | $x = -3$ | y-intercept | (0, -29) | <b>30.</b><br><table border="1"> <tr><td>Vertex</td><td>(1, -2)</td></tr> <tr><td>Domain</td><td><math>(-\infty, \infty)</math></td></tr> <tr><td>Range</td><td><math>(-2, \infty)</math></td></tr> <tr><td>Axis of symmetry</td><td><math>x = 1</math></td></tr> <tr><td>y-intercept</td><td>(0, -1)</td></tr> </table>    | Vertex | (1, -2)  | Domain | $(-\infty, \infty)$ | Range | $(-2, \infty)$  | Axis of symmetry | $x = 1$  | y-intercept | (0, -1)  |
| Vertex                                                                                                                                                                                                                                                                                                                       | (-3, -2)            |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Domain                                                                                                                                                                                                                                                                                                                       | $(-\infty, \infty)$ |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Range                                                                                                                                                                                                                                                                                                                        | $(-\infty, -2)$     |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Axis of symmetry                                                                                                                                                                                                                                                                                                             | $x = -3$            |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| y-intercept                                                                                                                                                                                                                                                                                                                  | (0, -29)            |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Vertex                                                                                                                                                                                                                                                                                                                       | (1, -2)             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Domain                                                                                                                                                                                                                                                                                                                       | $(-\infty, \infty)$ |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Range                                                                                                                                                                                                                                                                                                                        | $(-2, \infty)$      |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Axis of symmetry                                                                                                                                                                                                                                                                                                             | $x = 1$             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| y-intercept                                                                                                                                                                                                                                                                                                                  | (0, -1)             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| <b>31.</b><br><table border="1"> <tr><td>Vertex</td><td>(-1, -4)</td></tr> <tr><td>Domain</td><td><math>(-\infty, \infty)</math></td></tr> <tr><td>Range</td><td><math>(-4, \infty)</math></td></tr> <tr><td>Axis of symmetry</td><td><math>x = -1</math></td></tr> <tr><td>y-intercept</td><td>(0, -3)</td></tr> </table>   | Vertex              | (-1, -4) | Domain | $(-\infty, \infty)$ | Range | $(-4, \infty)$  | Axis of symmetry | $x = -1$ | y-intercept | (0, -3)  | <b>32.</b><br><table border="1"> <tr><td>Vertex</td><td>(5, 0)</td></tr> <tr><td>Domain</td><td><math>(-\infty, \infty)</math></td></tr> <tr><td>Range</td><td><math>(-\infty, 0)</math></td></tr> <tr><td>Axis of symmetry</td><td><math>x = 5</math></td></tr> <tr><td>y-intercept</td><td>(0, -25)</td></tr> </table>    | Vertex | (5, 0)   | Domain | $(-\infty, \infty)$ | Range | $(-\infty, 0)$  | Axis of symmetry | $x = 5$  | y-intercept | (0, -25) |
| Vertex                                                                                                                                                                                                                                                                                                                       | (-1, -4)            |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Domain                                                                                                                                                                                                                                                                                                                       | $(-\infty, \infty)$ |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Range                                                                                                                                                                                                                                                                                                                        | $(-4, \infty)$      |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Axis of symmetry                                                                                                                                                                                                                                                                                                             | $x = -1$            |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| y-intercept                                                                                                                                                                                                                                                                                                                  | (0, -3)             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Vertex                                                                                                                                                                                                                                                                                                                       | (5, 0)              |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Domain                                                                                                                                                                                                                                                                                                                       | $(-\infty, \infty)$ |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Range                                                                                                                                                                                                                                                                                                                        | $(-\infty, 0)$      |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Axis of symmetry                                                                                                                                                                                                                                                                                                             | $x = 5$             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| y-intercept                                                                                                                                                                                                                                                                                                                  | (0, -25)            |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| <b>33.</b><br><table border="1"> <tr><td>Vertex</td><td>(0, 3)</td></tr> <tr><td>Domain</td><td><math>(-\infty, \infty)</math></td></tr> <tr><td>Range</td><td><math>(-\infty, 3)</math></td></tr> <tr><td>Axis of symmetry</td><td><math>x = 0</math></td></tr> <tr><td>y-intercept</td><td>(0, 3)</td></tr> </table>       | Vertex              | (0, 3)   | Domain | $(-\infty, \infty)$ | Range | $(-\infty, 3)$  | Axis of symmetry | $x = 0$  | y-intercept | (0, 3)   | <b>34.</b><br><table border="1"> <tr><td>Vertex</td><td>(4, -4)</td></tr> <tr><td>Domain</td><td><math>(-\infty, \infty)</math></td></tr> <tr><td>Range</td><td><math>(-\infty, -4)</math></td></tr> <tr><td>Axis of symmetry</td><td><math>x = 4</math></td></tr> <tr><td>y-intercept</td><td>(0, 12)</td></tr> </table>   | Vertex | (4, -4)  | Domain | $(-\infty, \infty)$ | Range | $(-\infty, -4)$ | Axis of symmetry | $x = 4$  | y-intercept | (0, 12)  |
| Vertex                                                                                                                                                                                                                                                                                                                       | (0, 3)              |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Domain                                                                                                                                                                                                                                                                                                                       | $(-\infty, \infty)$ |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Range                                                                                                                                                                                                                                                                                                                        | $(-\infty, 3)$      |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Axis of symmetry                                                                                                                                                                                                                                                                                                             | $x = 0$             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| y-intercept                                                                                                                                                                                                                                                                                                                  | (0, 3)              |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Vertex                                                                                                                                                                                                                                                                                                                       | (4, -4)             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Domain                                                                                                                                                                                                                                                                                                                       | $(-\infty, \infty)$ |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Range                                                                                                                                                                                                                                                                                                                        | $(-\infty, -4)$     |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Axis of symmetry                                                                                                                                                                                                                                                                                                             | $x = 4$             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| y-intercept                                                                                                                                                                                                                                                                                                                  | (0, 12)             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| <b>35.</b><br><table border="1"> <tr><td>Vertex</td><td>(-1, 6)</td></tr> <tr><td>Domain</td><td><math>(-\infty, \infty)</math></td></tr> <tr><td>Range</td><td><math>(-\infty, 6)</math></td></tr> <tr><td>Axis of symmetry</td><td><math>x = -1</math></td></tr> <tr><td>y-intercept</td><td>(0, 3)</td></tr> </table>     | Vertex              | (-1, 6)  | Domain | $(-\infty, \infty)$ | Range | $(-\infty, 6)$  | Axis of symmetry | $x = -1$ | y-intercept | (0, 3)   | <b>36.</b><br><table border="1"> <tr><td>Vertex</td><td>(2, 7)</td></tr> <tr><td>Domain</td><td><math>(-\infty, \infty)</math></td></tr> <tr><td>Range</td><td><math>(7, \infty)</math></td></tr> <tr><td>Axis of symmetry</td><td><math>x = 2</math></td></tr> <tr><td>y-intercept</td><td>(0, 11)</td></tr> </table>      | Vertex | (2, 7)   | Domain | $(-\infty, \infty)$ | Range | $(7, \infty)$   | Axis of symmetry | $x = 2$  | y-intercept | (0, 11)  |
| Vertex                                                                                                                                                                                                                                                                                                                       | (-1, 6)             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Domain                                                                                                                                                                                                                                                                                                                       | $(-\infty, \infty)$ |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Range                                                                                                                                                                                                                                                                                                                        | $(-\infty, 6)$      |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Axis of symmetry                                                                                                                                                                                                                                                                                                             | $x = -1$            |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| y-intercept                                                                                                                                                                                                                                                                                                                  | (0, 3)              |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Vertex                                                                                                                                                                                                                                                                                                                       | (2, 7)              |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Domain                                                                                                                                                                                                                                                                                                                       | $(-\infty, \infty)$ |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Range                                                                                                                                                                                                                                                                                                                        | $(7, \infty)$       |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| Axis of symmetry                                                                                                                                                                                                                                                                                                             | $x = 2$             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |
| y-intercept                                                                                                                                                                                                                                                                                                                  | (0, 11)             |          |        |                     |       |                 |                  |          |             |          |                                                                                                                                                                                                                                                                                                                             |        |          |        |                     |       |                 |                  |          |             |          |