MATH 5 SN Name_____

MID YEAR REVIEW - MULTIPLE CHOICE

Perform the indicated operation.

1) $h(x) = -2x$
$g(x) = x^2 + 5$
Find $(h - g)(x)$

A) $-x^2 - 2x - 5$
B) $x^2 + 2x + 5$
C) $x^2 - 2x + 5$
D) $-x^2 - 3x + 1$

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

A) $-3x^2 + x$
B) $-x^3 + 5x^2 - x + 5$
C) $-3x^2 - x$
D) $x^2 - x - 4$

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

A) $4x^3 + 2x^2 + 3x + 3$
B) $-2x^3 - x^2 - 6x - 6$
C) $2x^3 - x^2 + 6x - 6$
D) $-2x^2 + 7x + 4$

4) $h(x) = 4x + 3$
$g(x) = 4x + 5$
Find $\left(\frac{h}{g}\right)(x)$

A) $\frac{x^3 + 4x^2}{3x - 2}$
B) $\frac{4x + 5}{4x + 3}$
C) $\frac{-4x + 5}{-4x + 3}$
D) $\frac{4x + 3}{4x + 5}$

5) $g(n) = n + 1$
$h(n) = 2n^3 + 4$
Find $(g \cdot h)(n)$

A) $n^4 + 4n^3 + 4n^2$
B) $-12n^4 + 12n^3 + 16n^2 - 16n$
C) $2n^4 - 2n^3 - 4n + 4$
D) $2n^4 + 2n^3 + 4n + 4$

6) $h(t) = 4t + 1$
$g(t) = 3t + 2$
Find $(h \circ g)(t)$

A) $12t + 9$
B) $12t + 5$
C) $4t - 11$
D) $2t^2 - 8$

7) $f(t) = 4t + 1$
$g(t) = t^3 - 5$
Find $(f \circ g)(t)$

A) $4t^3 - 19$
B) $4t + 3$
C) $64t^3 + 48t^2 + 12t - 4$
D) $-64t^3 + 48t^2 - 12t - 4$

8) $f(x) = -x^2 - 3 + x$
$g(x) = -2x + 1$
Find $(f \circ g)(x)$

A) $2x^2 - 2x + 7$
B) $2x^2 + 2x + 7$
C) $2x^2 + 6x - 4$
D) $-4x^2 + 2x - 3$

Find the inverse of each function.

9) $f(x) = x$

A) $f^{-1}(x) = x$
B) $f^{-1}(x) = -\frac{3}{7}x + \frac{6}{7}$
C) $f^{-1}(x) = -\frac{3}{5}x - \frac{6}{5}$
D) $f^{-1}(x) = \frac{16 - x}{4}$

10) $f(x) = -\dfrac{1}{-x-2}$

A) $f^{-1}(x) = \dfrac{2}{-x-3} - 2$

B) $f^{-1}(x) = -\dfrac{2}{-x-1} + 2$

C) $f^{-1}(x) = \dfrac{1}{x} - 2$

D) $f^{-1}(x) = \dfrac{4}{x-1}$

11) $f(x) = \sqrt[3]{x-1} - 1$

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

B) $f^{-1}(x) = \sqrt[3]{\dfrac{x}{2}}$

C) $f^{-1}(x) = \sqrt[3]{\dfrac{-x-2}{2}}$

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

12) $f(x) = \dfrac{2 - \sqrt[5]{16x}}{2}$

A) $f^{-1}(x) = -\sqrt[3]{x}$

B) $f^{-1}(x) = 2 + 2x^3$

C) $f^{-1}(x) = -2(x-1)^5$

D) $f^{-1}(x) = \sqrt[3]{x+2}$

13) $g(x) = \dfrac{3}{4}x - \dfrac{3}{2}$

A) $g^{-1}(x) = -3x$

B) $g^{-1}(x) = 2 + \dfrac{4}{3}x$

C) $g^{-1}(x) = -\dfrac{3}{5}x + 3$

D) $g^{-1}(x) = 2 - \dfrac{2}{5}x$

14) $g(x) = \dfrac{25 + 4x}{5}$

A) $g^{-1}(x) = \dfrac{1}{4}x + \dfrac{3}{4}$

B) $g^{-1}(x) = \dfrac{3}{5}x + \dfrac{3}{5}$

C) $g^{-1}(x) = \dfrac{5x - 25}{4}$

D) $g^{-1}(x) = \dfrac{-3 + 4x}{3}$

15) $f(x) = -\dfrac{3}{x} + 1$

A) $f^{-1}(x) = -\dfrac{4}{x+1} + 2$

B) $f^{-1}(x) = -\dfrac{4}{-x-2} + 2$

C) $f^{-1}(x) = -\dfrac{3}{x+2}$

D) $f^{-1}(x) = -\dfrac{3}{x-1}$

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

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

B) $f^{-1}(x) = 2(x+1)^3$

C) $f^{-1}(x) = -2(x+1)^5$

D) $f^{-1}(x) = \sqrt[3]{x+2} - 2$

Simplify.

17) $9\sqrt{144xy^4z^4}$

A) $-8\sqrt{210y}$ B) $-\sqrt{30}$

C) $72xz\sqrt{xyz}$ D) $108y^2z^2\sqrt{x}$

18) $-7\sqrt{448a^5b^2c^4}$

A) $90a^2b^2c^2\sqrt{2a}$
B) $28a^2bc\sqrt{2b}$
C) $30a^2bc\sqrt{6abc}$
D) $-56a^2c^2b\sqrt{7a}$

19) $-4\sqrt{64p^3q^5r^5}$

A) $63r^2\sqrt{6pq}$
B) $180p^2r^2\sqrt{pq}$
C) $200qr\sqrt{p}$
D) $-32q^2r^2p\sqrt{pqr}$

20) $-3\sqrt{180h^4jk^5}$

A) $-32h^2j\sqrt{3k}$
B) $80h^2j^2k\sqrt{6jk}$
C) $-16k^2h\sqrt{6hj}$
D) $-18h^2k^2\sqrt{5jk}$

21) $-\sqrt{8}+2\sqrt{2}-3\sqrt{2}$

A) 0
B) $-\sqrt{2}$
C) $-4\sqrt{2}$
D) $-3\sqrt{2}$

22) $3\sqrt{5}+2\sqrt{54}+2\sqrt{5}$

A) $-\sqrt{5}$
B) $5\sqrt{5}+6\sqrt{6}$
C) $2\sqrt{5}+6\sqrt{6}$
D) $-\sqrt{5}+6\sqrt{6}$

23) $-2\sqrt{5}+3\sqrt{20}-2\sqrt{3}$

A) $10\sqrt{5}-4\sqrt{3}$
B) $4\sqrt{5}-2\sqrt{3}$
C) $10\sqrt{5}-6\sqrt{3}$
D) $4\sqrt{5}-4\sqrt{3}$

24) $-\sqrt{45}-3\sqrt{45}+3\sqrt{3}$

A) $-12\sqrt{5}$
B) $-3\sqrt{5}$
C) $-12\sqrt{5}+3\sqrt{3}$
D) $-3\sqrt{5}+3\sqrt{3}$

25) $\left(-2+\sqrt{5}\right)\left(-5+\sqrt{5}\right)$

A) $15-7\sqrt{5}$
B) 16
C) 12
D) 15

26) $\left(\sqrt{2}-4\right)\left(\sqrt{2}-3\right)$

A) $-9\sqrt{2}+5$
B) 14
C) $14-7\sqrt{2}$
D) $4-4\sqrt{30}$

27) $\left(\sqrt{2}+4\sqrt{5}\right)\left(\sqrt{2}-5\sqrt{5}\right)$

A) $-25\sqrt{2}+4$
B) $-25\sqrt{2}-8$
C) $-98-\sqrt{10}$
D) -98

28) $\left(-\sqrt{3}+\sqrt{5}\right)^2$

A) $8-2\sqrt{15}$
B) 9
C) $5\sqrt{3}+5$
D) 8

29) $\dfrac{\sqrt{2}}{2+\sqrt{5}}$

A) $\dfrac{\sqrt{3}-1}{2}$
B) $\dfrac{2\sqrt{2}+\sqrt{10}}{2}$
C) $-2\sqrt{2}+\sqrt{10}$
D) $\dfrac{-10-4\sqrt{3}}{13}$

30) $\dfrac{3\sqrt{5}}{3-\sqrt{2}}$

A) $\dfrac{5+10\sqrt{5}}{19}$

B) $\dfrac{9\sqrt{5}+3\sqrt{10}}{7}$

C) $\dfrac{2+5\sqrt{3}}{4}$

D) $\dfrac{3\sqrt{5}-\sqrt{10}}{15}$

31) $\dfrac{5\sqrt{5}}{\sqrt{2}}$

A) $\dfrac{3\sqrt{3}}{2}$ B) $\dfrac{\sqrt{15}}{5}$

C) $\dfrac{\sqrt{6}}{2}$ D) $\dfrac{5\sqrt{10}}{2}$

32) $\dfrac{4\sqrt{9}}{5\sqrt{15}}$

A) $\dfrac{5\sqrt{15}}{12}$ B) $\dfrac{4\sqrt{15}}{25}$

C) $\dfrac{2\sqrt{15}}{3}$ D) $\dfrac{3\sqrt{10}}{5}$

Solve each equation.

33) $-7\left|3-x\right| = -21$

A) No solution. B) $\{0, 6\}$

C) $\left\{4, -\dfrac{24}{5}\right\}$ D) $\{4\}$

34) $\left|-9r-6\right| - 10 = 50$

A) $\{-3, 10\}$ B) $\left\{-\dfrac{27}{4}, 7\right\}$

C) $\left\{-\dfrac{22}{3}, 6\right\}$ D) $\{-3\}$

35) $\left|1+5p\right| + 4 = 28$

A) $\{10, -16\}$ B) $\left\{\dfrac{23}{5}, -5\right\}$

C) $\left\{-\dfrac{2}{5}, 2\right\}$ D) $\{10\}$

36) $2\left|-2-3n\right| = 50$

A) $\left\{-\dfrac{6}{5}\right\}$ B) $\left\{-9, \dfrac{23}{3}\right\}$

C) $\left\{-\dfrac{6}{5}, -2\right\}$ D) $\left\{\dfrac{28}{3}, -10\right\}$

37) $\dfrac{1}{36} \cdot \left(\dfrac{1}{6}\right)^{-2x} = 36^{3x-2}$

A) $\{0\}$

B) $\left\{-\dfrac{1}{4}\right\}$

C) { All real numbers. }

D) $\left\{\dfrac{1}{2}\right\}$

38) $\dfrac{1}{5} \cdot 125^{-2n+1} = 25$

A) $\{0\}$ B) $\{2\}$

C) $\{7\}$ D) $\left\{\dfrac{1}{3}\right\}$

39) $25^{-3m-3} \cdot 125^{-m} = 1$

A) { All real numbers. }

B) $\left\{-\frac{2}{3}\right\}$

C) $\left\{\frac{3}{4}\right\}$

D) $\{-8\}$

40) $\left(\frac{1}{216}\right)^{2n} \cdot 36^{3n} = 216$

A) $\{-10\}$

B) No solution.

C) $\left\{\frac{5}{4}\right\}$

D) { All real numbers. }

41) $20^{n-2} + 3 = 76$

A) $\log_{76} 17 + 2$

B) $\log_{20} \frac{73}{2} - 20$

C) $\log_{3} 56 + 2$

D) $\log_{20} 73 + 2$

42) $20^{9x} - 1 = 67$

A) $\frac{\log_{67} 8 + 1}{20}$

B) $\frac{\log_{20} 68}{9}$

C) $\log_{20} \frac{10}{67} - 20$

D) $\frac{\log_{20} \frac{67}{9} + 1}{20}$

43) $10 \cdot 10^{4x} = 100$

A) $-\frac{1}{2}$ B) $\frac{\log 90}{4}$

C) $-\frac{1}{5}$ D) $\frac{1}{4}$

44) $14^{-4n} + 3 = 54$

A) $-\frac{\log_{54} 11}{4}$

B) $-\frac{\log_{14} 51}{4}$

C) $\log_{54} \frac{13}{3} + 4$

D) $\frac{-\log_{3} 13 + 54}{4}$

45) $\log_{19}(-5x + 1) = \log_{19}(x^2 + 1)$

A) $\{0, -5\}$ B) $\{6, -5\}$

C) $\{0\}$ D) $\{6, 2\}$

46) $\log_{6}(-18 - 3k^2) = \log_{6}(-2k^2 + 9k)$

A) No solution. B) $\{7\}$

C) $\{7, 6\}$ D) $\{-6, -3\}$

47) $\log(11x + 1) = \log(x^2 + 25)$

A) $\{3\}$ B) $\{3, 8\}$

C) $\{8\}$ D) $\{-1, 3\}$

48) $\log_{19}(k^2 + 39) = \log_{19}(-13k + 3)$

A) $\{-6, 7\}$ B) $\{-6\}$

C) $\{-9, -4\}$ D) $\{-4\}$

49) $\log_{8}(x^2 - 1) - \log_{8} 10 = 1$

A) $\{4, -4\}$ B) $\{2, -2\}$

C) $\{3, -3\}$ D) $\{9, -9\}$

50) $\log_{7} 4x^2 - \log_{7} 9 = 2$

A) $\left\{\frac{21}{2}, -\frac{21}{2}\right\}$ B) $\{1, -1\}$

C) $\{1\}$ D) $\{5\}$

51) $\log_{3}(x + 6) + \log_{3} x = 3$

A) $\{-9, -1\}$ B) No solution.

C) $\{3, -9\}$ D) $\{3\}$

52) $\log_{5} 5x^2 + \log_{5} 9 = 3$

A) $\{1\}$ B) No solution.

C) $\left\{\frac{5}{3}, -\frac{5}{3}\right\}$ D) $\{1, -1\}$

Solve each equation by taking square roots.

53) $81n^2 - 10 = -1$

A) $\left\{\frac{1}{3}, -\frac{1}{3}\right\}$

B) $\left\{\frac{1}{3}\right\}$

C) $\{\sqrt{43}, -\sqrt{43}\}$

D) $\left\{\frac{133}{3}, -\frac{133}{3}\right\}$

54) $-10 - 3n^2 = -253$

A) $\left\{\frac{\sqrt{789}}{3}, -\frac{\sqrt{789}}{3}\right\}$

B) $\left\{\frac{\sqrt{789}}{3}\right\}$

C) $\{81, -81\}$

D) $\{9, -9\}$

55) $5 - 4n^2 = -191$

A) $\{7, -7\}$ B) $\left\{\frac{\sqrt{186}}{2}\right\}$

C) $\{49, -49\}$ D) $\{7\}$

56) $9b^2 + 5 = 653$

A) $\{\sqrt{58}, -\sqrt{58}\}$ B) $\{72, -72\}$

C) $\{6\sqrt{2}, -6\sqrt{2}\}$ D) $\{58, -58\}$

Solve each equation. Remember to check for extraneous solutions.

57) $4 = \sqrt{7p + 2}$

A) $\{1, -5\}$ B) $\{2\}$

C) $\{-5\}$ D) $\{5\}$

58) $1 = \sqrt{6 - m}$

A) $\{-1\}$ B) $\{3, -1\}$

C) $\{3\}$ D) $\{5\}$

59) $3 = \sqrt{\frac{x}{5}}$

A) $\{45\}$ B) $\{1, 45\}$

C) $\{4, -4\}$ D) $\{1\}$

60) $\sqrt{1 - v} = \sqrt{3v + 25}$

A) $\{-6\}$ B) $\{-1\}$

C) $\{8\}$ D) $\{1, 8\}$

Solve each equation.

61) $6x - 7x = 4(-4x + 5) + 5(-x - 4)$

A) { All real numbers. } B) $\{7\}$

C) $\{10\}$ D) $\{0\}$

62) $2(-6r + 8) + 5 = 8r - 3(4 + 3r)$

A) $\{13\}$ B) $\{-3\}$

C) $\{12\}$ D) $\{3\}$

63) $-4(-4 + m) - 6 = -5(m - 4)$

A) $\{13\}$ B) $\{5\}$

C) $\{-7\}$ D) $\{10\}$

64) $p + \frac{17}{6} + \frac{1}{4} = \frac{101}{60}$

A) { All real numbers. }

B) $\left\{-\frac{8}{11}\right\}$

C) $\left\{-\frac{5}{3}\right\}$

D) $\left\{-\frac{7}{5}\right\}$

Solve each equation by factoring.

65) $42x^2 - 47 = 108x + 7$

A) $\left\{-\frac{6}{7}, 3\right\}$ B) $\left\{-\frac{7}{3}, -7\right\}$

C) $\left\{-\frac{3}{7}, 3\right\}$ D) $\left\{\frac{3}{7}, -3\right\}$

66) $28v^2 - 20v - 113 = 8v - 8$

A) $\left\{-\frac{3}{2}, \frac{1}{7}\right\}$ B) $\left\{-\frac{1}{3}, 1\right\}$

C) $\left\{\frac{3}{2}, -\frac{5}{2}\right\}$ D) $\left\{-\frac{3}{2}, \frac{5}{2}\right\}$

67) $7 + 16b = -5 - 5b^2$

A) $\left\{-\frac{6}{5}, 7\right\}$ B) $\left\{\frac{6}{5}, -7\right\}$

C) $\left\{-\frac{6}{5}, -2\right\}$ D) $\left\{\frac{2}{7}, 6\right\}$

68) $2p^2 - 19p - 5 = -5p^2 + 1$

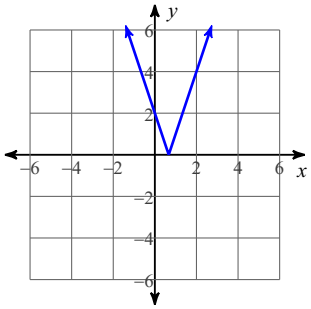
A) $\left\{-\frac{2}{7}, 3\right\}$ B) $\left\{\frac{2}{7}, 5\right\}$

C) $\left\{\frac{7}{3}, -1\right\}$ D) $\left\{\frac{2}{7}, -3\right\}$

Graph each equation.

69) $y = -3\left|-3x - 2\right|$

A)



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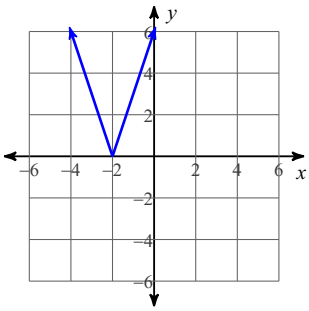

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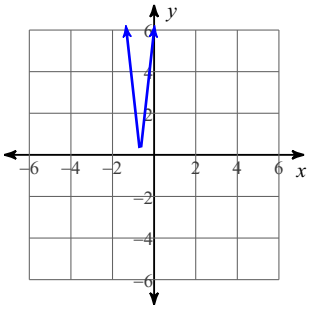

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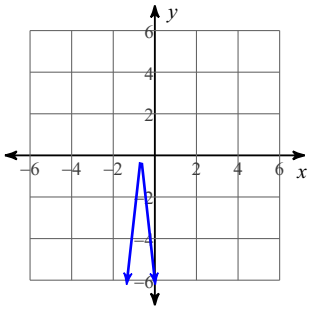
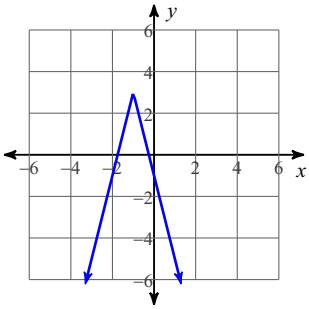
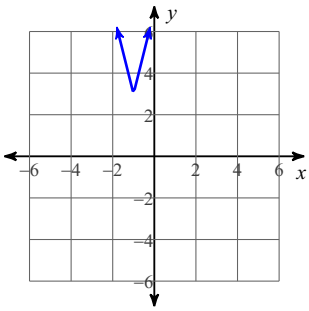


70) $y = 2\left|-2x - 2\right| + 3$

A)



B)



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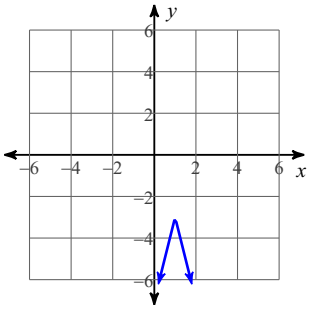

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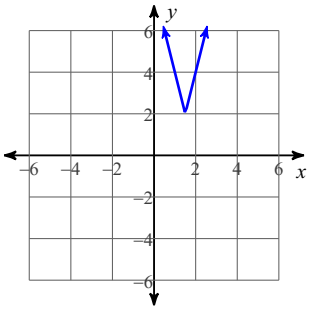
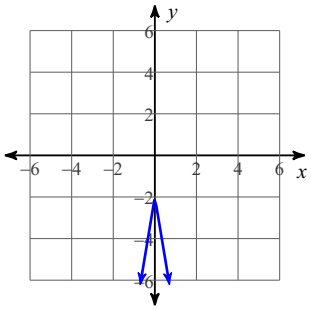


71) $y = -2\left|3x\right| - 2$

A)



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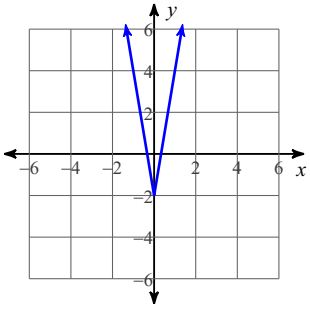

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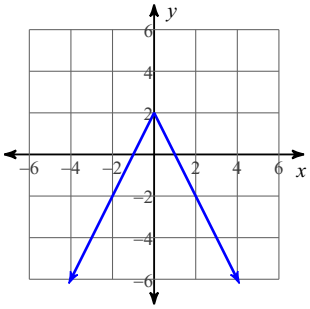
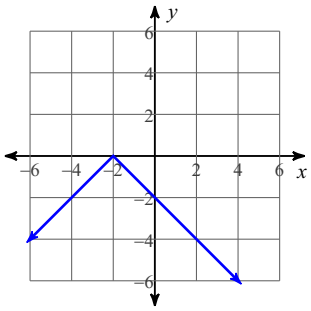
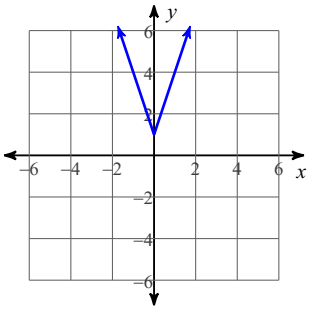


D)



72) $y = -3\left|2x + 1\right|$

A)



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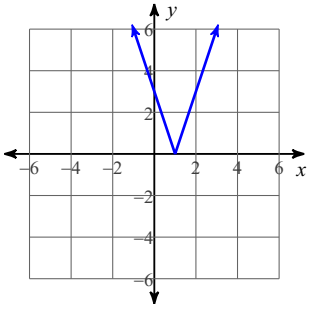

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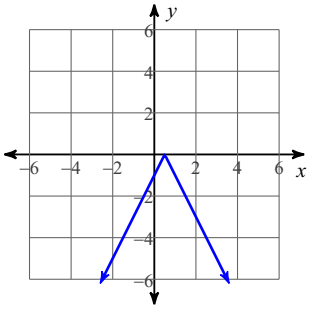
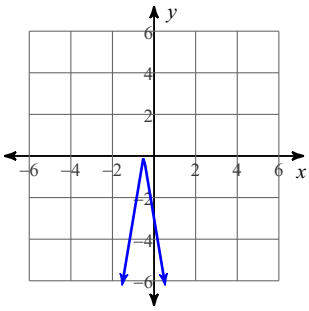


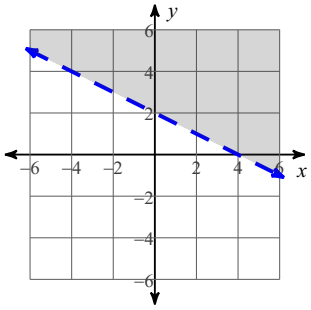
D)



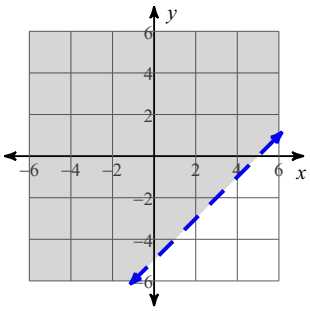
Sketch the graph of each linear inequality.

73) $y \le x - 5$

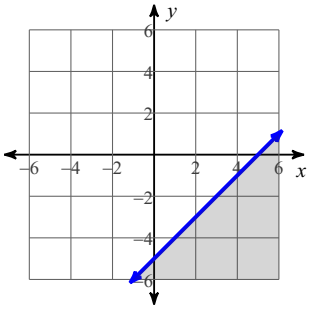
A)



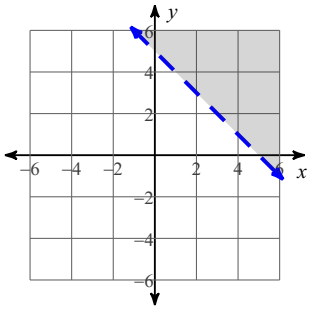
B)



C)

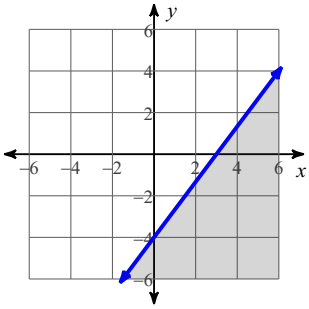


D)

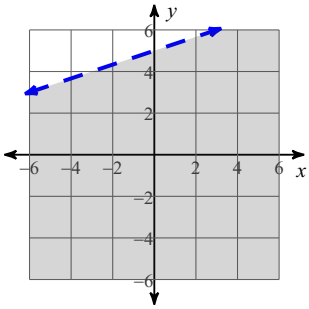


74) $y > \frac{4}{3}x - 4$

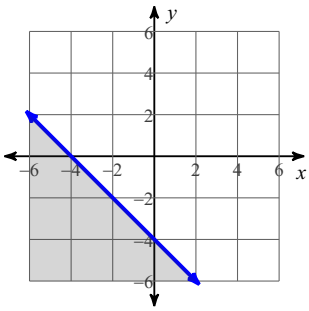
A)



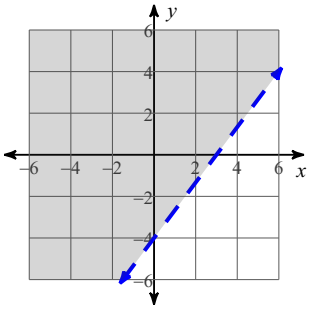
B)



C)

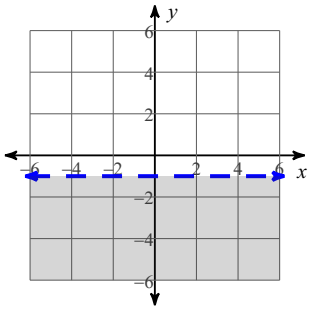


D)

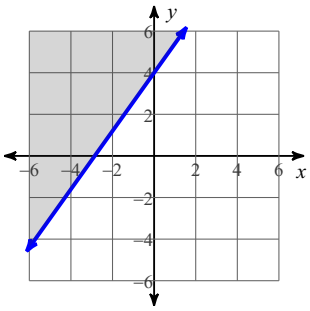


75) $y < -1$

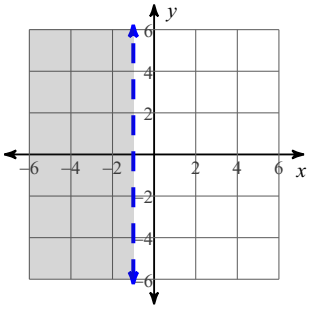
A)



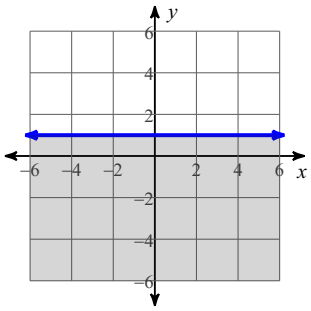
B)



C)

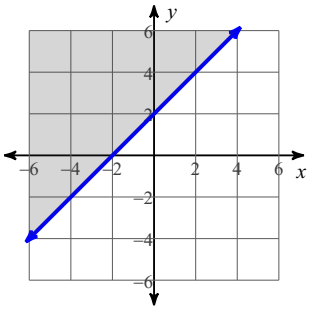


D)

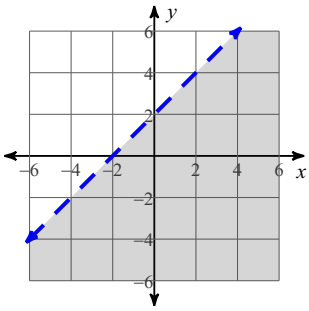


76) $y > x - 2$

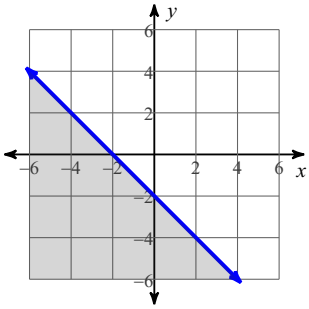
A)



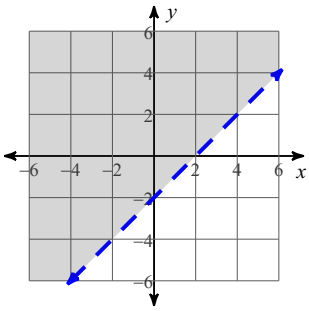
B)



C)



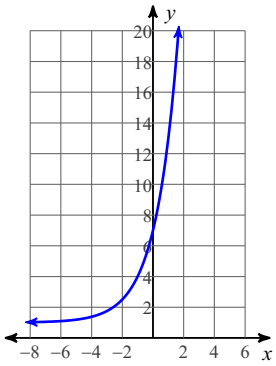
D)



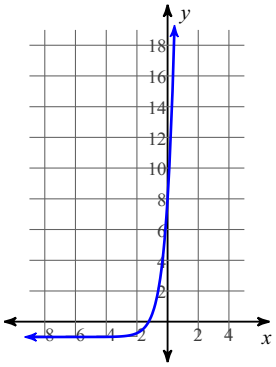
Sketch the graph of each function.

77) $f(x) = 3 \cdot 2^{x+1} + 1$

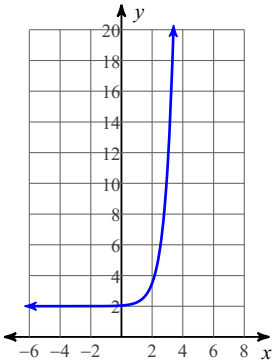
A)



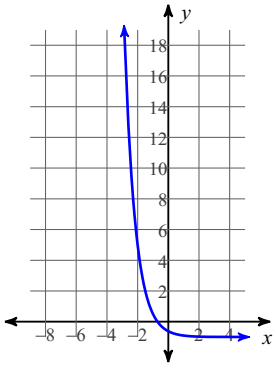
B)



C)

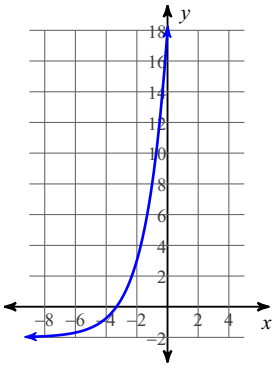


D)

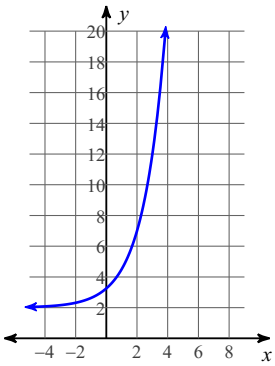


78) $f(x) = 5 \cdot 2^{x-2} + 1$

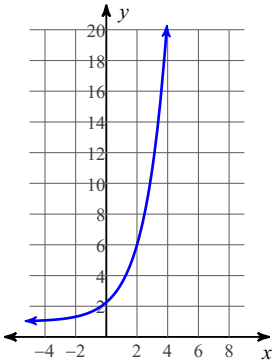
A)



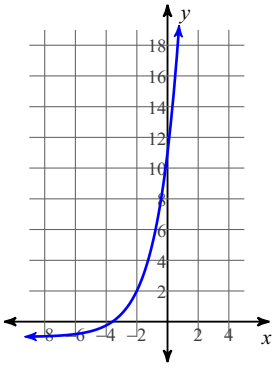
B)



C)

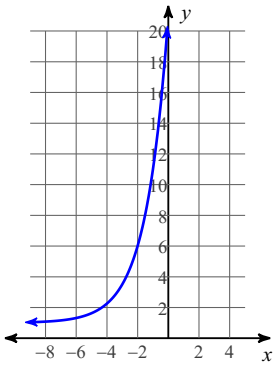


D)

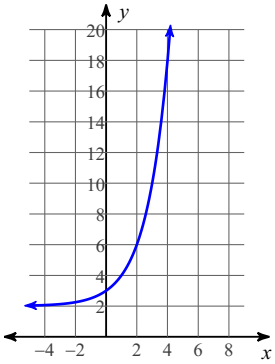


79) $f(x) = \frac{1}{4} \cdot 6^{x+1} - 2$

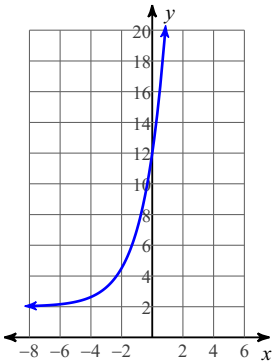
A)



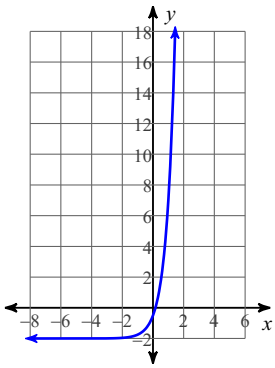
B)



C)

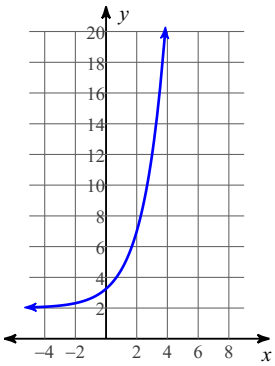


D)

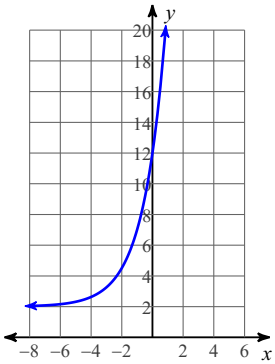


80) $f(x) = 5 \cdot 2^{x-2} + 2$

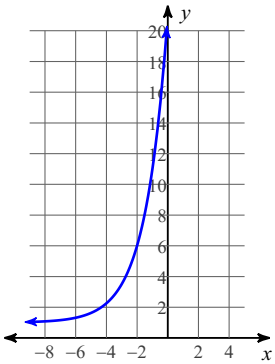
A)



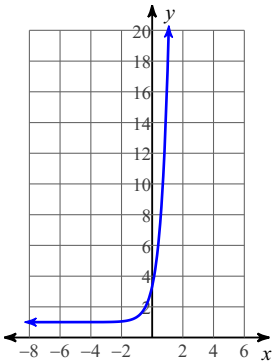
B)



C)



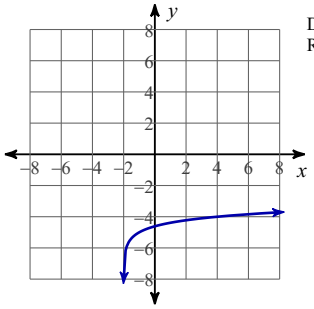
D)



Identify the domain and range of each. Then sketch the graph.

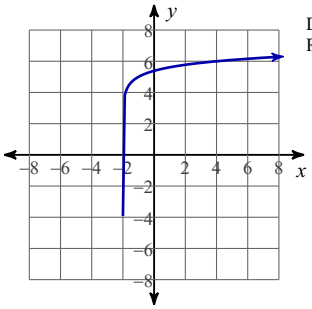
81) $f(x) = \log_6 (x - 2) - 5$

A)



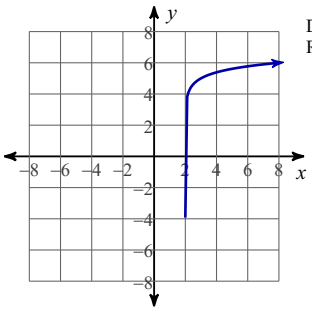
Domain: $x > -2$
Range: All reals

B)



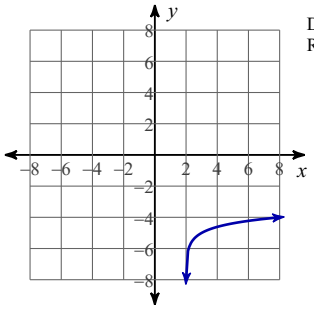
Domain: $x > -2$
Range: All reals

C)



Domain: $x > 2$
Range: All reals

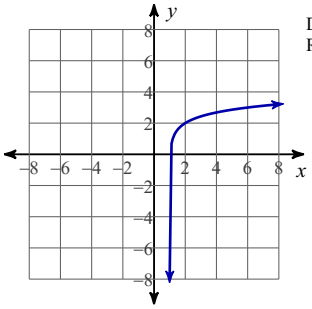
D)



Domain: $x > 2$
Range: All reals

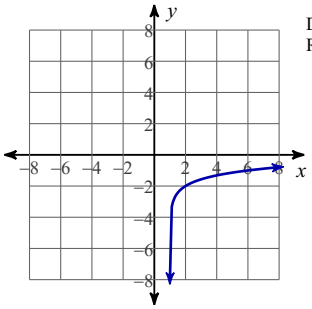
82) $f(x) = \log_5 (x - 1) + 2$

A)



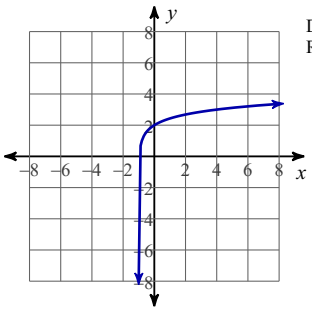
Domain: $x > 1$
Range: All reals

B)



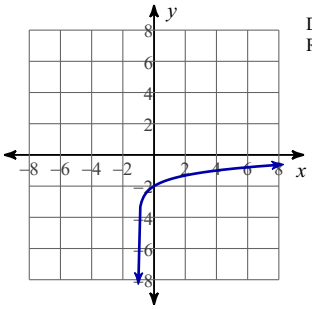
Domain: $x > 1$
Range: All reals

C)



Domain: $x > -1$
Range: All reals

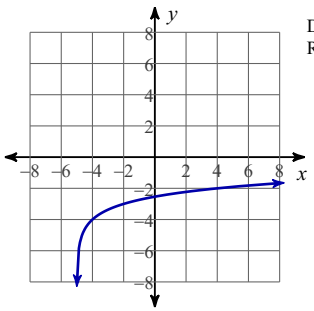
D)



Domain: $x > -1$
Range: All reals

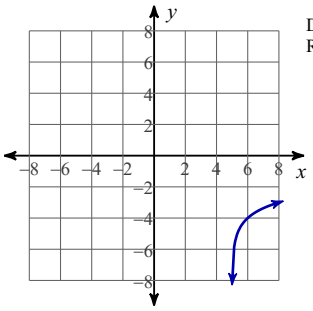
83) $f(x) = \log_3 (x + 5) - 4$

A)



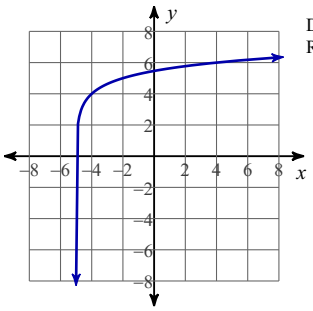
Domain: $x > -5$
Range: All reals

B)



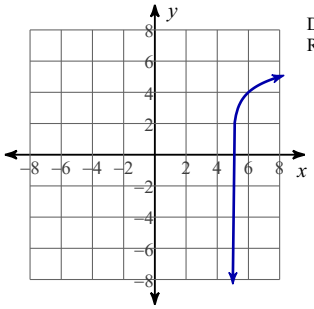
Domain: $x > 5$
Range: All reals

C)



Domain: $x > -5$
Range: All reals

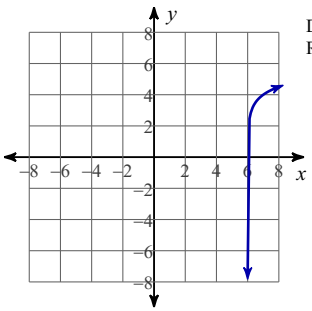
D)



Domain: $x > 5$
Range: All reals

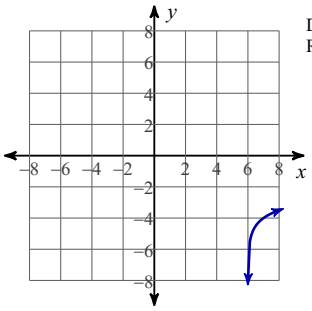
84) $f(x) = \log_4 (x + 6) - 4$

A)



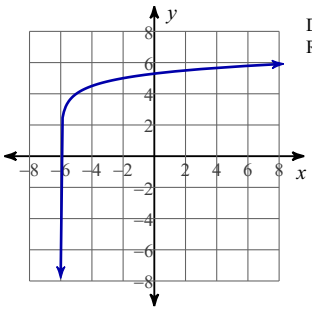
Domain: $x > 6$
Range: All reals

B)



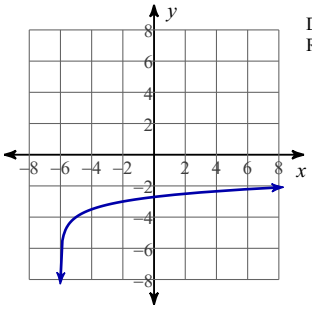
Domain: $x > 6$
Range: All reals

C)



Domain: $x > -6$
Range: All reals

D)

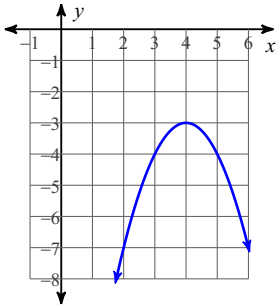


Domain: $x > -6$
Range: All reals

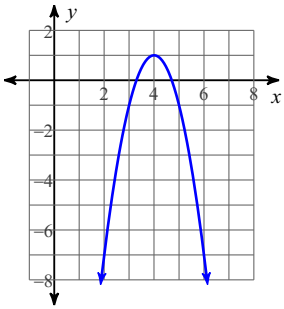
Sketch the graph of each function.

85) $y = x^2 - 6x + 12$

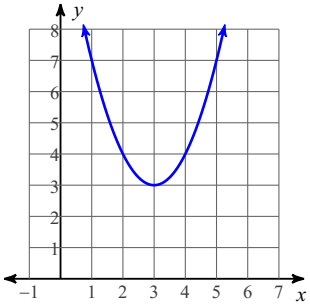
A)



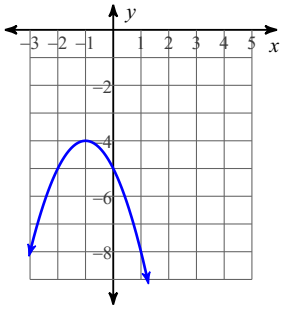
B)



C)

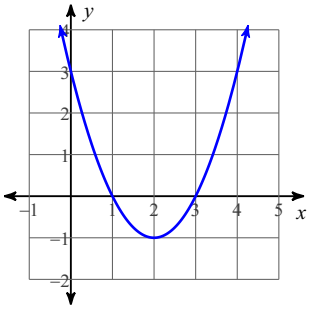


D)

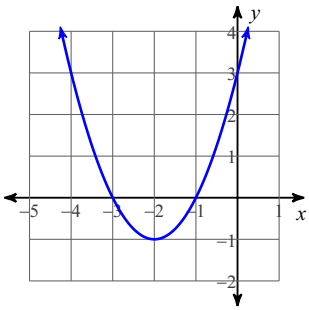


86) $y = x^2 + 2x + 4$

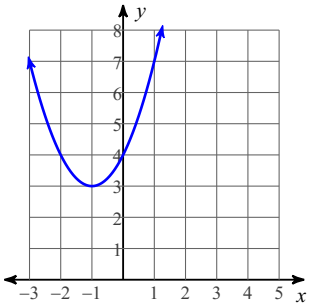
A)



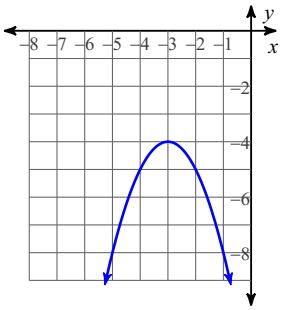
B)



C)

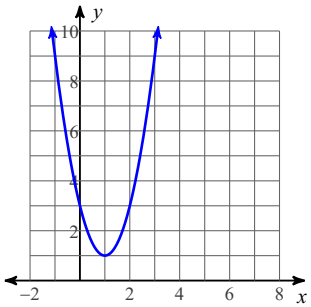


D)

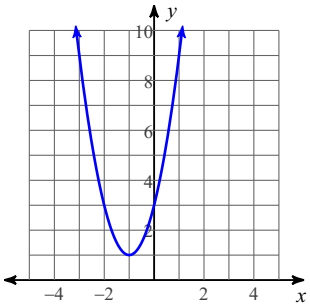


87) $y = (x + 4)^2 + 1$

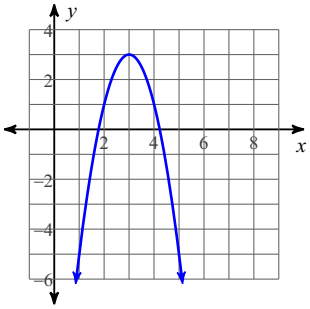
A)



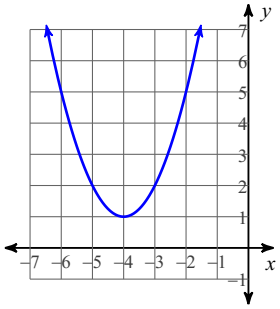
B)



C)

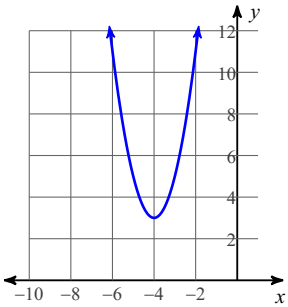


D)

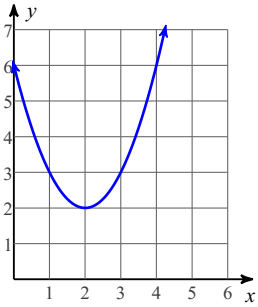


88) $y = (x + 2)^2 + 2$

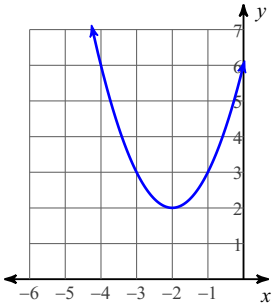
A)



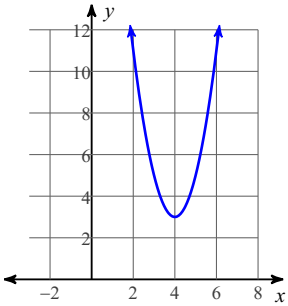
B)



C)



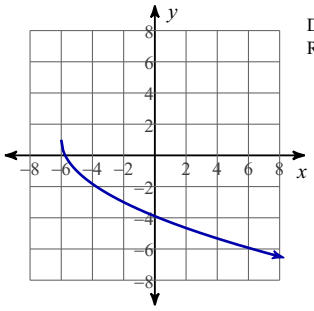
D)



Identify the domain and range of each. Then sketch the graph.

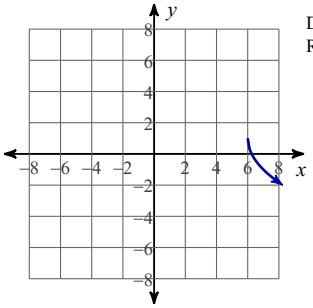
89) $y = 1 - 2\sqrt{x + 6}$

A)



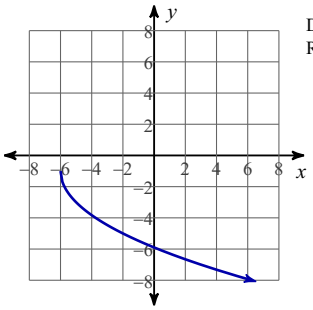
Domain: $x \geq -6$
Range: $y \geq 1$

B)



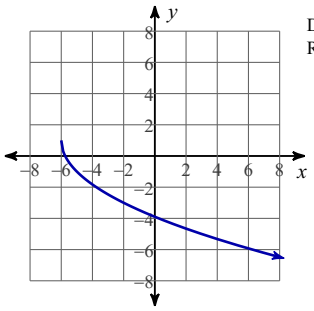
Domain: $x \geq 6$
Range: $y \leq 1$

C)



Domain: $x \geq -6$
Range: $y \leq -1$

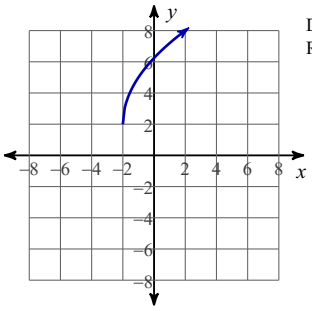
D)



Domain: $x \geq -6$
Range: $y \leq 1$

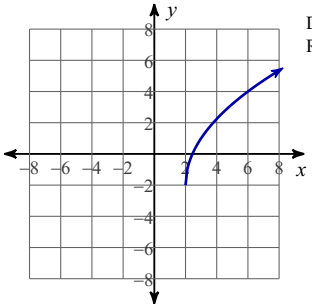
90) $y = -2 + \sqrt{9x - 18}$

A)



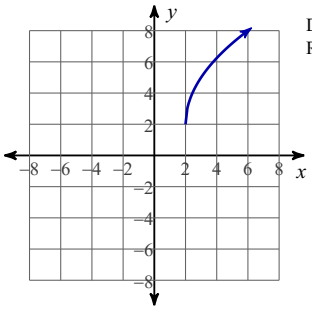
Domain: $x \geq -2$
Range: $y \geq 2$

B)



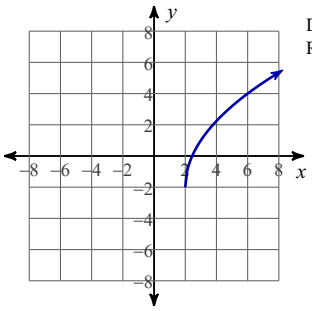
Domain: $x \geq 2$
Range: $y \leq -2$

C)



Domain: $x \geq 2$
Range: $y \geq 2$

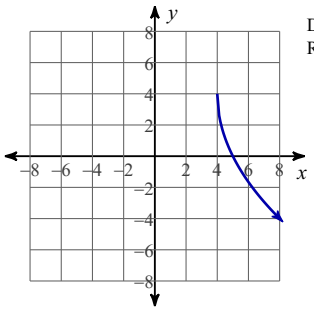
D)



Domain: $x \geq 2$
Range: $y \geq -2$

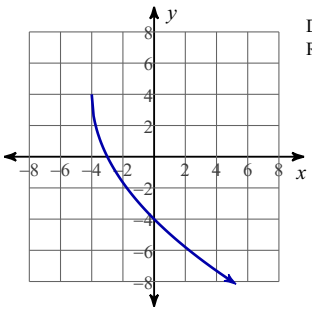
91) $y = 4 - 4\sqrt{x - 4}$

A)



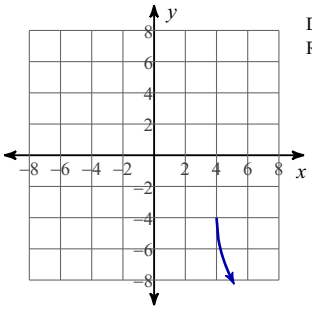
Domain: $x \geq 4$
Range: $y \leq 4$

B)



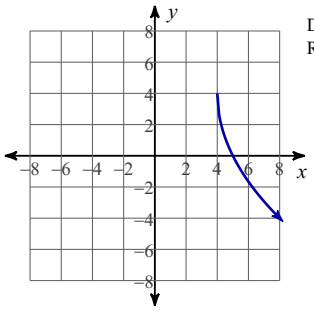
Domain: $x \geq -4$
Range: $y \leq 4$

C)



Domain: $x \geq 4$
Range: $y \leq -4$

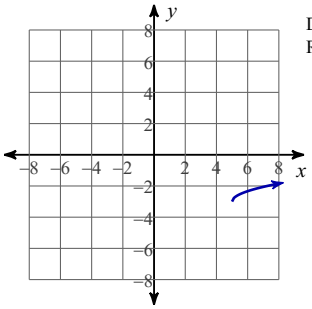
D)



Domain: $x \geq 4$
Range: $y \geq 4$

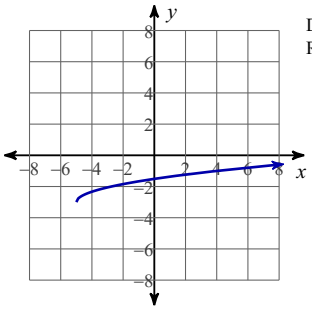
92) $y = \sqrt{\dfrac{4x + 20}{9}} + 3$

A)



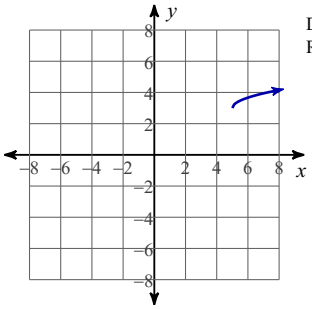
Domain: $x \geq 5$
Range: $y \geq -3$

B)



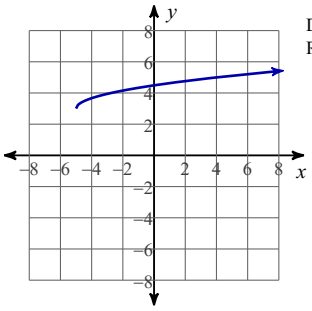
Domain: $x \geq -5$
Range: $y \geq -3$

C)



Domain: $x \geq 5$
Range: $y \geq 3$

D)



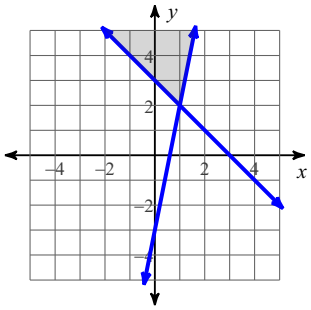
Domain: $x \geq -5$
Range: $y \geq 3$

Sketch the solution to each system of inequalities.

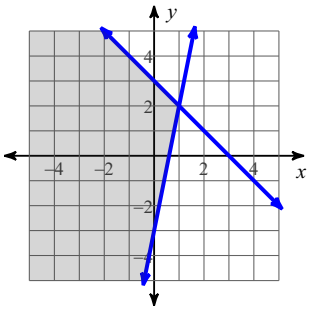
93) $x \geq -3$

$y \leq \frac{2}{3}x - 1$

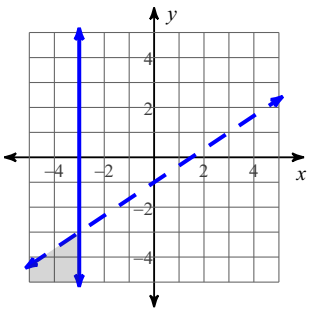
A)



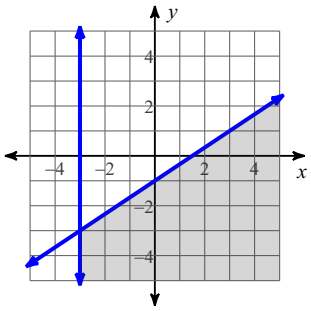
B)



C)



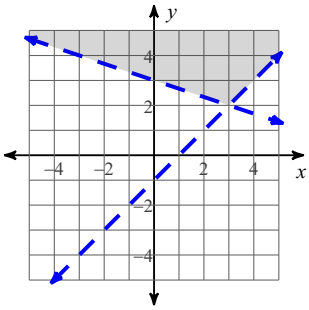
D)



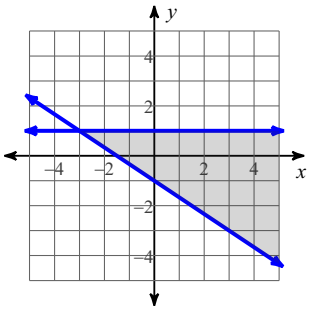
94) $y \leq -\frac{2}{3}x - 1$

$y \leq 1$

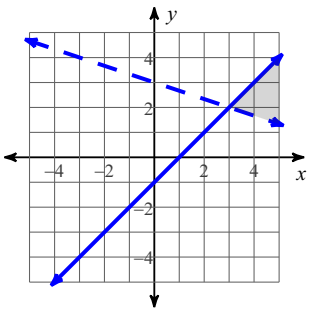
A)



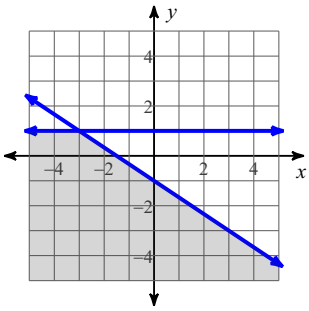
B)



C)



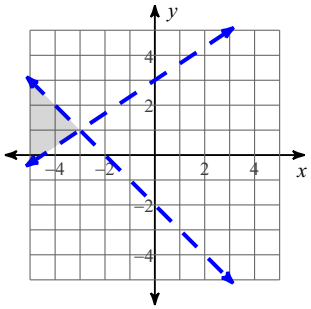
D)



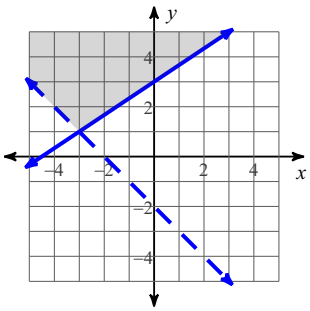
95) $y < -x - 2$

$y > \frac{2}{3}x + 3$

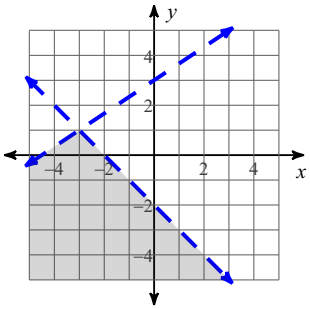
A)



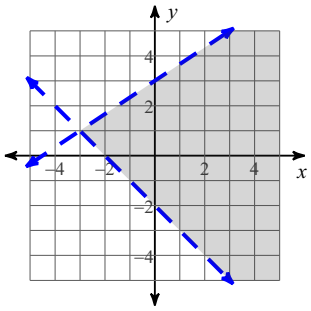
B)



C)



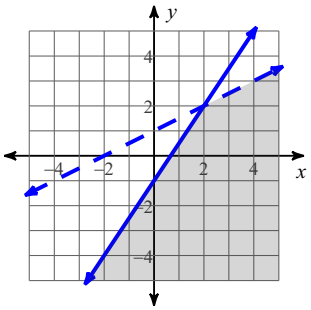
D)



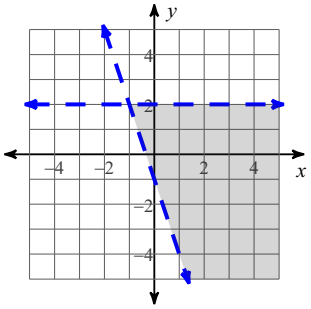
96) $y < 2$

$y > -3x - 1$

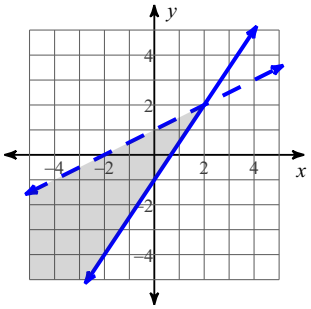
A)



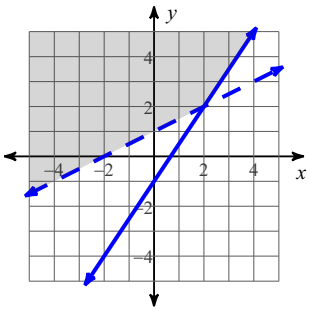
B)



C)



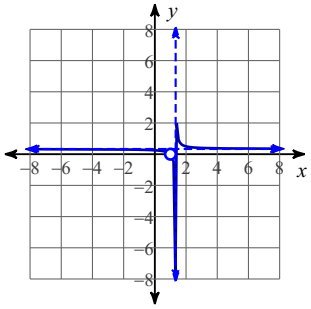
D)



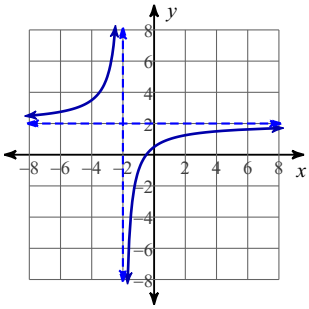
Graph each function.

97) $f(x) = -\dfrac{1}{x-1} + 3$

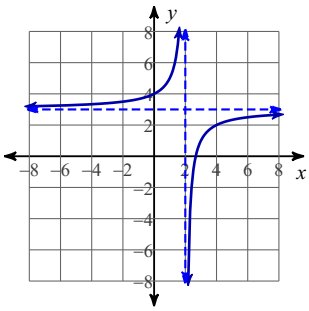
A)



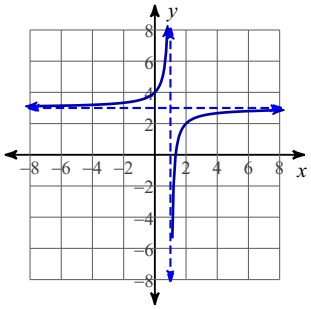
B)



C)

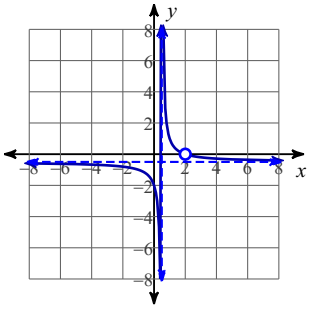


D)

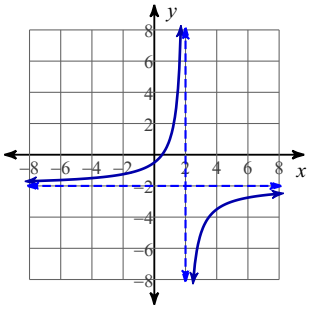


98) $f(x) = -\dfrac{3}{x-2} - 2$

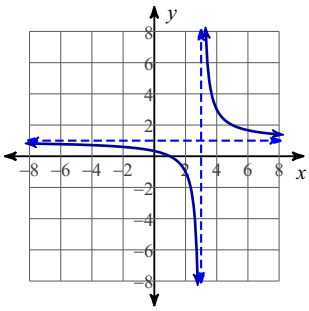
A)



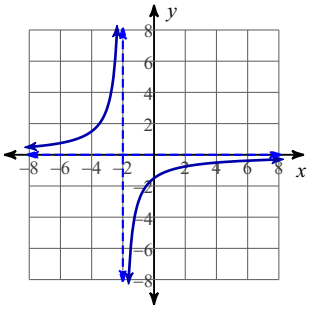
B)



C)

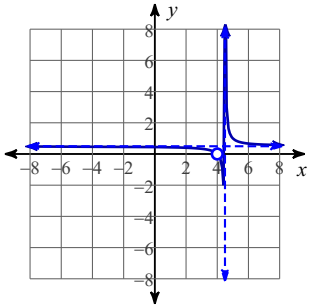


D)

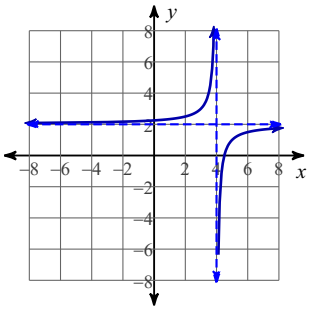


99) $f(x) = -\dfrac{1}{x-4} + 2$

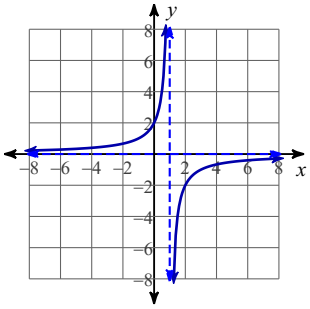
A)



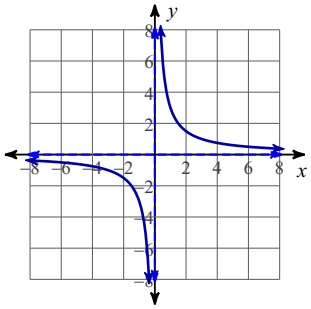
B)



C)

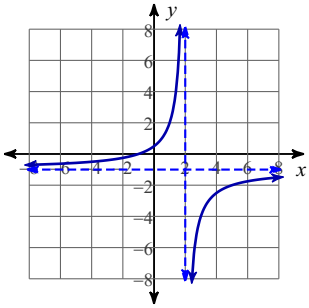


D)

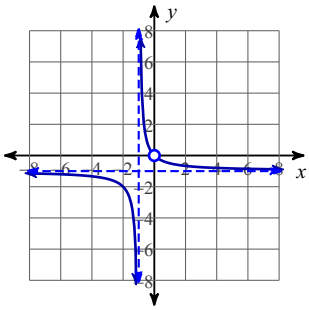


100) $f(x) = -\dfrac{1}{x} - 1$

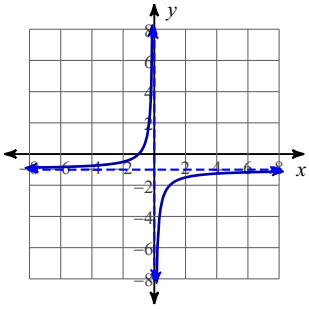
A)



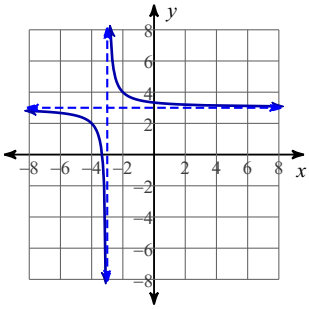
B)



C)



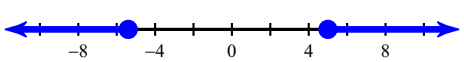
D)



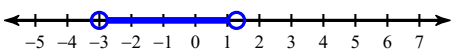
Solve each inequality and graph its solution.

101) $-3\left|7n+6\right| > -45$

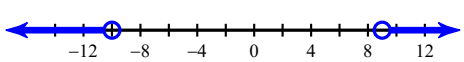
A) $n \geq 5$ or $n \leq -\dfrac{27}{5}$:



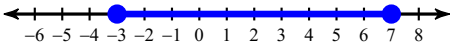
B) $-3 < n < \dfrac{9}{7}$:



C) $n > 9$ or $n < -10$:



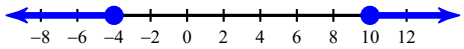
D) $-3 \leq n \leq 7$:



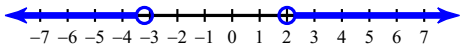
102) $9 + \left|10n + 6\right| > 35$

A) $-\frac{16}{5} < n < 2$:

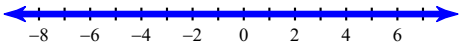
B) $n \le -4$ or $n \ge 10$:



C) $n > 2$ or $n < -\frac{16}{5}$:

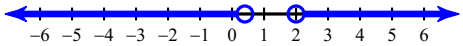


D) { All real numbers. } :

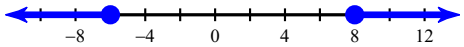


103) $\left|2x - 2\right| + 9 \ge 23$

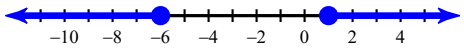
A) $x < \frac{2}{5}$ or $x > 2$:



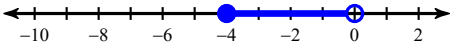
B) $x \ge 8$ or $x \le -6$:



C) $x \le -6$ or $x \ge 1$:

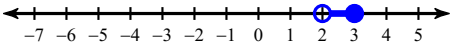


D) $-4 \le x < 0$:

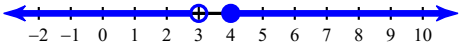


104) $\frac{\left|5k + 4\right|}{2} > 4$

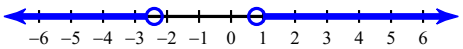
A) $2 < k \le 3$:



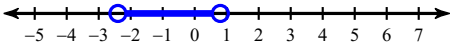
B) $k < 3$ or $k \ge 4$:



C) $k > \frac{4}{5}$ or $k < -\frac{12}{5}$:



D) $-\frac{12}{5} < k < \frac{4}{5}$:



Condense each expression to a single logarithm.

105) $8\log_4 a + 2\log_4 b + 2\log_4 c$

A) $\log_4 \frac{a^2}{c^2 b^8}$

B) $\log_4 \left(c^2 b^2 a^8\right)$

C) $\log_4 \left(dc\sqrt{ba}\right)$

D) $\log_4 \left(cb^2 a^4\right)$

106) $3\log_5 x - 3\log_5 z - 9\log_5 y$

A) $\log_5 \left(wzy\sqrt[3]{x}\right)$

B) $\log_5 \frac{x^3}{z^3 y^9}$

C) $\log_5 \frac{z^9 x^9}{y^3}$

D) $\log_5 \left(z^3 y^3 x^9\right)$

107) $\log_4 d + \frac{\log_4 a}{3} + \frac{\log_4 b}{3} + \frac{\log_4 c}{3}$

A) $\log_4 \left(d\sqrt[3]{cba}\right)$

B) $\log_4 \frac{a^{24}}{c^6 b^6}$

C) $\log_4 \frac{c^6 a^6}{b^{24}}$

D) $\log_4 \left(c^6 b^6 a^{24}\right)$

108) $\log_9 5 + 5\log_9 3 + \frac{\log_9 8}{2}$

A) $\log_9 \frac{8^3}{3^3 \cdot 5^{15}}$

B) $\log_9 \left(5 \cdot 3^5\sqrt{8}\right)$

C) $\log_9 \frac{8^{15}}{3^3 \cdot 5^3}$

D) $\log_9 \frac{3 \cdot 8^5}{5^3}$

Expand each logarithm.

109) $\log_4 \frac{12^4}{11 \cdot 7^2}$

A) $2\log_4 12 + 8\log_4 7 + 2\log_4 11$

B) $4\log_4 12 - \log_4 11 - 2\log_4 7$

C) $4\log_4 12 + 2\log_4 7 + \log_4 11$

D) $\log_4 5 + \frac{\log_4 12}{2} + \frac{\log_4 7}{2} + \frac{\log_4 11}{2}$

110) $\log_3 \left(x \cdot y \cdot w \cdot z^4\right)$

A) $12\log_3 z + 12\log_3 x - 3\log_3 y$

B) $\log_3 x + \log_3 y + \log_3 w + 4\log_3 z$

C) $3\log_3 z + 3\log_3 x + 12\log_3 y$

D) $3\log_3 x + 3\log_3 z - 12\log_3 y$

111) $\log_6 \frac{10^5}{3 \cdot 11^2}$

A) $\frac{3\log_6 11}{2} + \frac{\log_6 10}{2} + \frac{\log_6 3}{2}$

B) $2\log_6 3 + 2\log_6 10 + 10\log_6 11$

C) $2\log_6 3 + 10\log_6 10 + 2\log_6 11$

D) $5\log_6 10 - \log_6 3 - 2\log_6 11$

112) $\log_3 \left(5 \cdot 11\sqrt[3]{12 \cdot 7}\right)$

A) $4\log_3 12 + 2\log_3 7 + 2\log_3 5$

B) $\log_3 5 + \log_3 11 + \frac{\log_3 12}{3} + \frac{\log_3 7}{3}$

C) $2\log_3 12 + 2\log_3 7 + \log_3 5$

D) $4\log_3 12 - 2\log_3 7 - 2\log_3 5$

Find the inverse of each function.

113) $y = \log\left(-2x^3 + 6\right)$

A) $y = \frac{10^{\frac{x+10}{9}}}{-3}$

B) $y = 10^{-x+7} + 9$

C) $y = \left(\frac{10^x - 6}{-2}\right)^{\frac{1}{3}}$

D) $y = \log_4 \frac{10^{-\frac{x}{3}}}{3}$

114) $y = 9\log(2x) - 6$

A) $y = \log_2 \frac{10^{-\frac{x}{8}}}{4}$

B) $y = \frac{10^{\frac{x+6}{9}}}{2}$

C) $y = \frac{10^{x-5} + 10}{4}$

D) $y = \left(10^{x+6} - 4\right)^{\frac{1}{5}}$

115) $y = \log_2 \frac{10^x - 2}{2}$

A) $y = \log\left(3x^4 + 8\right)$
B) $y = \log\left(-3x^3 - 6\right)$
C) $y = \log\left(-3x^4 - 6\right)$
D) $y = \log\left(2^{1+x} + 2\right)$

116) $y = \left(\frac{10^x + 7}{3}\right)^{\frac{1}{5}}$

A) $y = \log\left(-3x^3 - 10\right)$
B) $y = \log\left(-4x^5 + 2\right)$
C) $y = \log\left(3x^5 - 7\right)$
D) $y = \log\left(-3x^5 - 7\right)$

Use the properties of logarithms and the logarithms provided to rewrite each logarithm in terms of the variables given.

117) $\log_9 7 = R$
$\log_9 6 = S$
$\log_9 10 = T$
Find $\log_9 5400$

A) $1 + S + 2T$
B) $3R - 9$
C) $729R$
D) $9 - T - 2S$

118) $\log_8 5 = R$
$\log_8 6 = S$
$\log_8 9 = T$
Find $\log_8 \frac{5}{288}$

A) $-R - S - T$
B) $\frac{1}{8SR}$
C) $R - 1 - 2S$
D) $8R^3$

119) $\log_7 8 = A$
$\log_7 12 = B$
$\log_7 9 = C$
Find $\log_7 \frac{1}{768}$

A) $\frac{B}{C^3}$
B) $\frac{1}{BA^2}$
C) $\frac{343}{B}$
D) $-2A - B$

120) $\log_6 4 = X$
$\log_6 10 = Y$
$\log_6 11 = Z$
Find $\log_6 \frac{25}{4}$

A) $\frac{6Y}{Z^2}$
B) $-2Y - Z$
C) $6 + Y - 2Z$
D) $2Y - 2X$

Answers to MID YEAR REVIEW - MULTIPLE CHOICE

1) A	2) A	3) B	4) D
5) D	6) A	7) A	8) D
9) A	10) C	11) D	12) C
13) B	14) C	15) D	16) D
17) D	18) D	19) D	20) D
21) D	22) B	23) B	24) C
25) A	26) C	27) C	28) A
29) C	30) B	31) D	32) B
33) B	34) C	35) B	36) B
37) D	38) A	39) B	40) B
41) D	42) B	43) D	44) B
45) A	46) A	47) B	48) C
49) D	50) A	51) D	52) C
53) A	54) D	55) A	56) C
57) B	58) D	59) A	60) A
61) D	62) D	63) D	64) D
65) C	66) D	67) C	68) A
69) D	70) B	71) A	72) D
73) C	74) D	75) A	76) D
77) A	78) C	79) D	80) A
81) D	82) A	83) A	84) D
85) C	86) C	87) D	88) C
89) D	90) D	91) A	92) D
93) D	94) D	95) A	96) B
97) D	98) B	99) B	100) C
101) B	102) C	103) B	104) C
105) B	106) B	107) A	108) B
109) B	110) B	111) D	112) B
113) C	114) B	115) D	116) C
117) A	118) C	119) D	120) D