Entering Algebra 3
(Post Algebra 2)
Summer Homework



Name

_____

Please read all instructions before beginning this packet.

This packet is designed to serve as a checkpoint for the material covered in your Delta Math online assignment. You must complete the Delta Math assignment first before starting this packet.

Show all work directly in this packet.
If you need additional space, use lined paper and clearly label each problem.
Submit the completed printed packet when you return to school in August.

To maintain your academic progress, the math department at CSN expects you to spend approximately one hour per week working on these problem sets. Most problems can be completed without a calculator, but use when necessary.

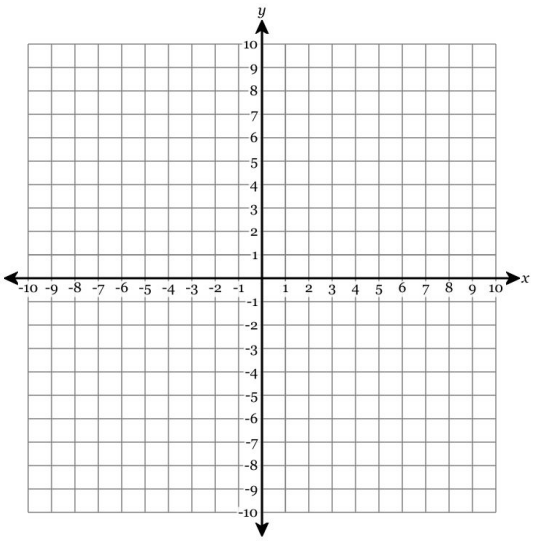
Your grade will be based on:

- Completion
- Accuracy
- A beginning-of-year assessment given during the first week of school

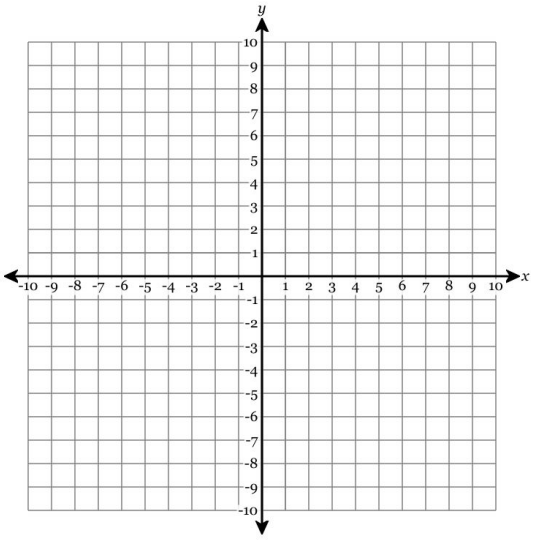
Please give your best effort. This work helps reflect your individual strengths and areas for growth, and it also allows the department to analyze overall student performance. Teachers will use this information to adjust instruction and better support your learning.

Please reach out to your teacher or the department chair with any questions or concerns.

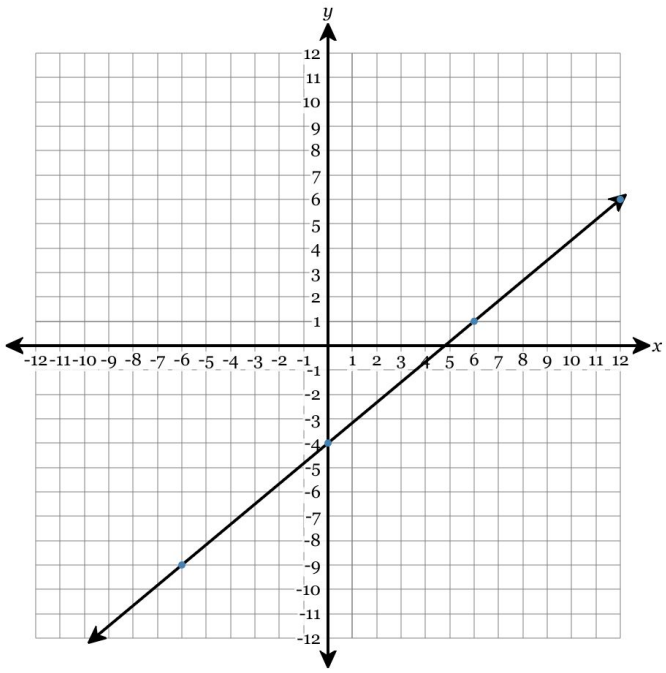
1. Graph the line with the equation $y = -\frac{2}{5}x + 1$.



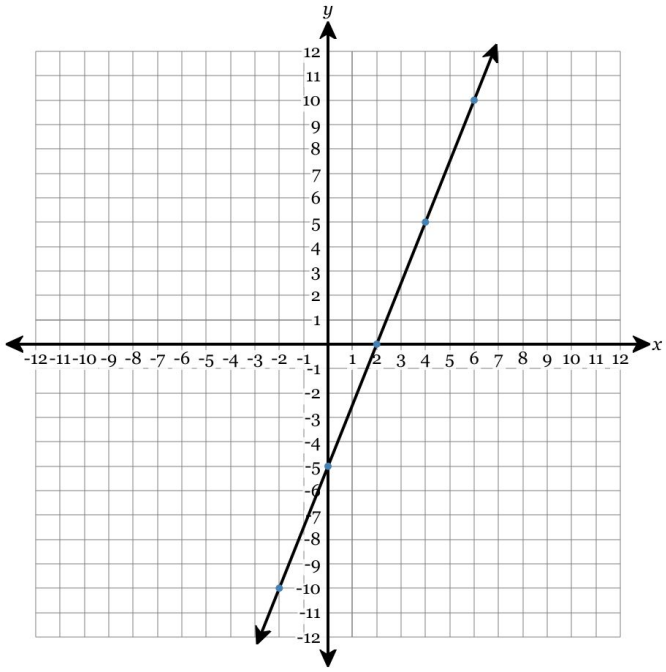
2. Graph the line with the equation $y = \frac{4}{5}x + 2$.



3. Write the equation of the line in fully simplified slope-intercept form.



4. Write the equation of the line in fully simplified slope-intercept form.



5. What is the equation of the line that passes through the point $(-5, -6)$ and has a slope of $-\frac{1}{5}$?

6. What is the equation of the line that passes through the point $(-1, -8)$ and has a slope of 2?

7. Find the solution of the system of equations.

$$-3x + 10y = 2$$
$$-3x + 3y = 9$$

8. Find the solution of the system of equations.

$$-4x + y = 23$$
$$4x - 9y = -15$$

9. Find the solution of the system of equations.

$$-2x - 5y = -15$$
$$-9x + 15y = -30$$

10. Find the solution of the system of equations.

$$-2x + 9y = -17$$
$$-x - 3y = -1$$

11. Solve the system by substitution.

$$y = 8x + 32$$
$$y = -8x$$

12. Solve the system by substitution.

$$y = -6x$$
$$y = -4x + 4$$

13. Solve the system by substitution.

$$-9x - 2y = -12$$
$$-3x = y$$

14. Solve the system by substitution.

$$10x - 2y = 18$$
$$8x = y$$

15. Find the x- and y-intercepts of the graph of $x + 8y = 29$.

16. Find the x- and y-intercepts of the graph of $x + 7y = 40$.

17. Factor completely:

$$16x^2(2x + 5) - 9(2x + 5)$$

18. Factor completely:

$$x^2(3x^2 + 2) - 2x(3x^2 + 2) - 15(3x^2 + 2)$$

19. Factor $x^2 + 14x + 45$

20. Factor $x^2 + 2x - 80$

21. Factor the trinomial: $3x^2 + 17x + 20$

22. Factor the trinomial: $2x^2 + 17x + 21$

23. Solve the equation for *all values* of x.

$$-2(x^2 - 1)(49x^2 - 4) = 0$$

24. Solve the equation for *all values* of x.

$$(16x^2 - 49)(x^2 + 1) = 0$$

25. Solve the equation for *all values* of x.

$$5x + 1 = 0$$

26. Solve the equation for *all values* of x.

$$x - 5 = 0$$

27. What are the roots of the equation?

$$5x^2 + 9x = 2$$

A. $\frac{-9 \pm \sqrt{41}}{10}$

B. 2 and $-\frac{1}{5}$

C. $\frac{9 \pm \sqrt{41}}{10}$

D. $\frac{1}{5}$ and -2

28. What are the roots of the equation?

$$6x^2 - 7x - 3 = 0$$

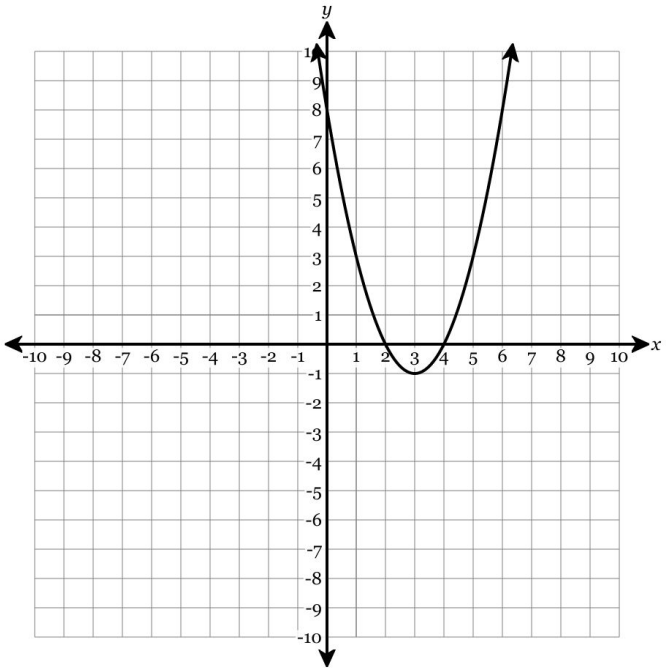
A. $\frac{1}{3}$ and $-\frac{3}{2}$

B. $\frac{3}{2}$ and $-\frac{1}{3}$

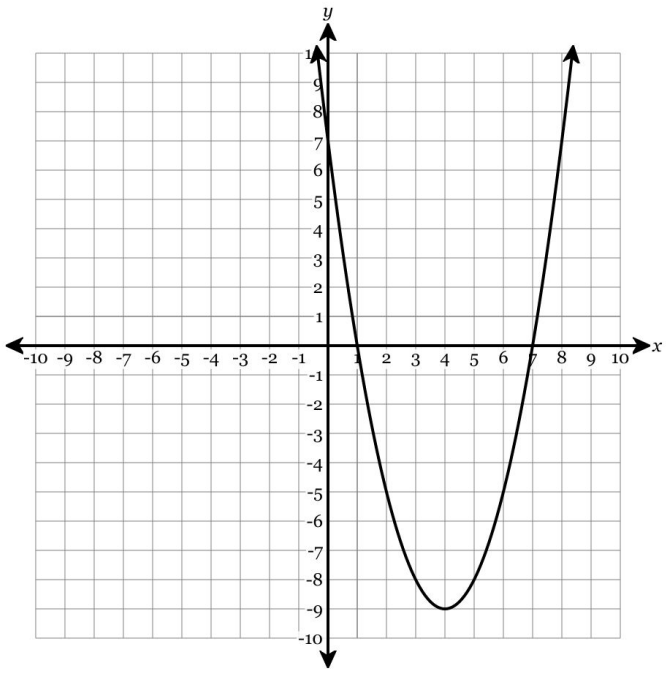
C. $\frac{7 \pm \sqrt{23}}{12}$

D. $\frac{-7 \pm \sqrt{23}}{12}$

29. Using the graph, determine the coordinates of the x-intercepts of the parabola.



30. Using the graph, determine the coordinates of the zeros of the parabola.



31. Find the coordinates of the vertex of the following parabola algebraically. Write your answer as an (x, y) point.

$$y = -5x^2 + 40x - 70$$

32. Find the equation of the axis of symmetry of the following parabola algebraically.

$$y = -x^2 + 2x + 6$$

33. Subtract $9x^2 + 8x - 5$ from $-4x - 9$.

34. Perform the operation.

$$(3x + 2) - (4x^2 + 1)$$

35. Express as a trinomial: $(3x - 1)(x + 6)$

36. Express as a trinomial: $(2x + 6)(2x + 1)$

37. Expand the expression to a polynomial in standard form:

$$(-2x + 3)(3x^2 - 4x + 8)$$

38. Expand the expression to a polynomial in standard form:

$$(2x - 3)(3x^2 - 7x - 2)$$

39. Use synthetic division to find the result when $4x^3 - 13x^2 - 8x - 16$ is divided by $x - 4$.

40. Use synthetic division to find the result when $2x^4 + 17x^3 + 30x^2 - 18x + 24$ is divided by $x + 4$.

41. What is the leading coefficient of the polynomial $f(x)$ defined below?

$$f(x) = -7x^4 + x^5 - 4x^2 + 9x$$

42. What is the leading term of the polynomial $f(x)$ defined below?

$$f(x) = -x^5 + 6x^7 - 7x^3 - 2 - 6x^2$$

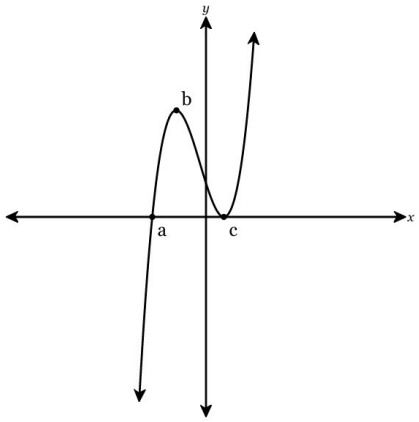
43. Find the *y-coordinate* of the y-intercept of the polynomial function defined below.

$$f(x) = 8x^2 - 8x - 7x^3$$

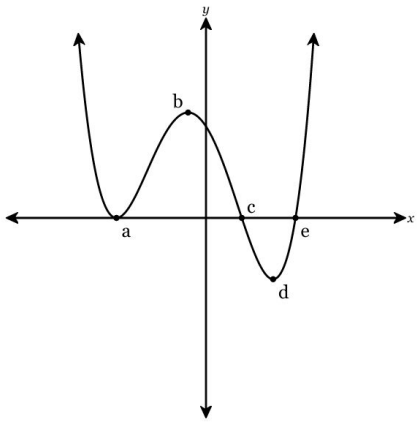
44. Find the *y-coordinate* of the y-intercept of the polynomial function defined below.

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

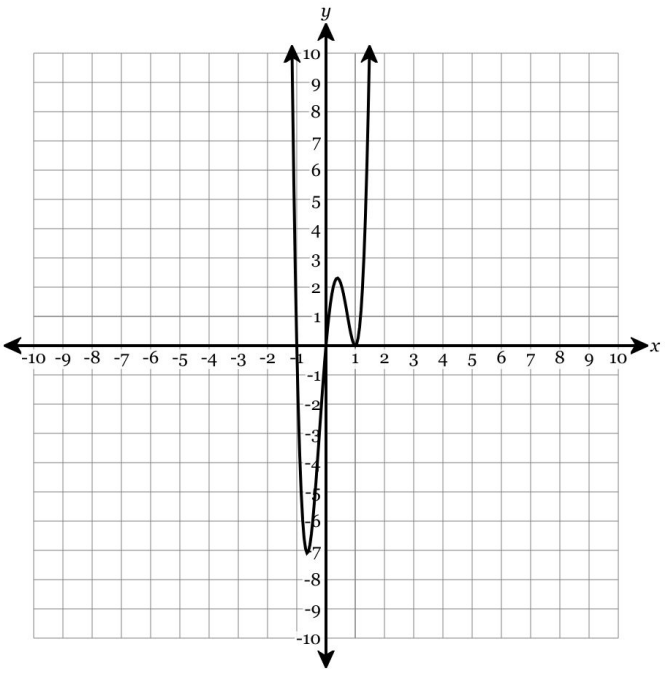
45. The function $f(x)$ is graphed below. Circle all relative extrema.



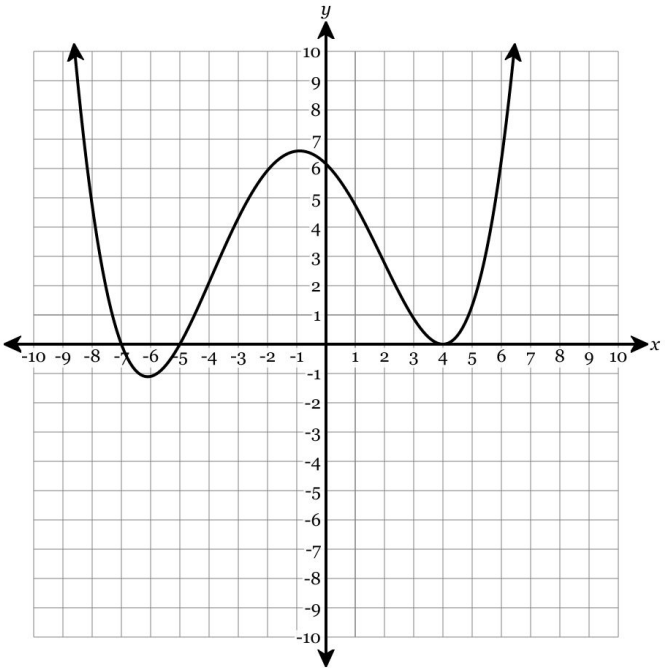
46. The function $f(x)$ is graphed below. Circle all relative maxima.



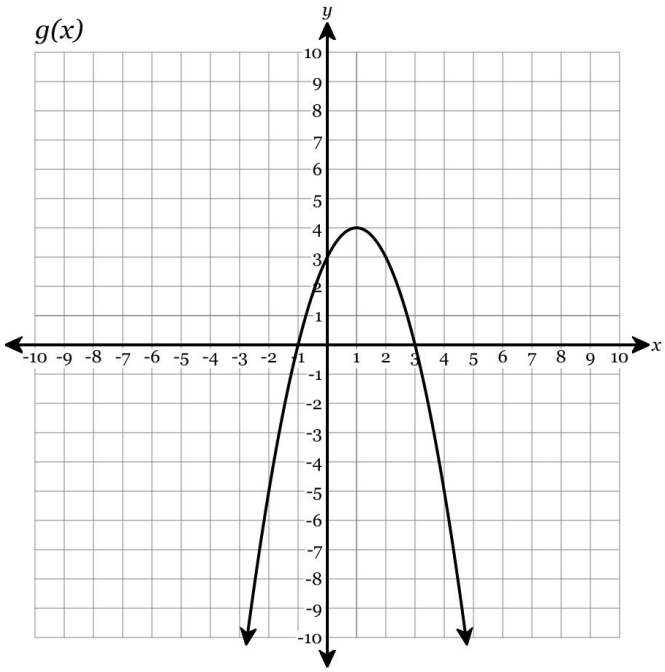
47. The graph of y = f(x) is shown below. What are all of the real solutions of f(x) = 0?



48. The graph of y = f(x) is shown below. What are all of the real solutions of f(x) = 0?



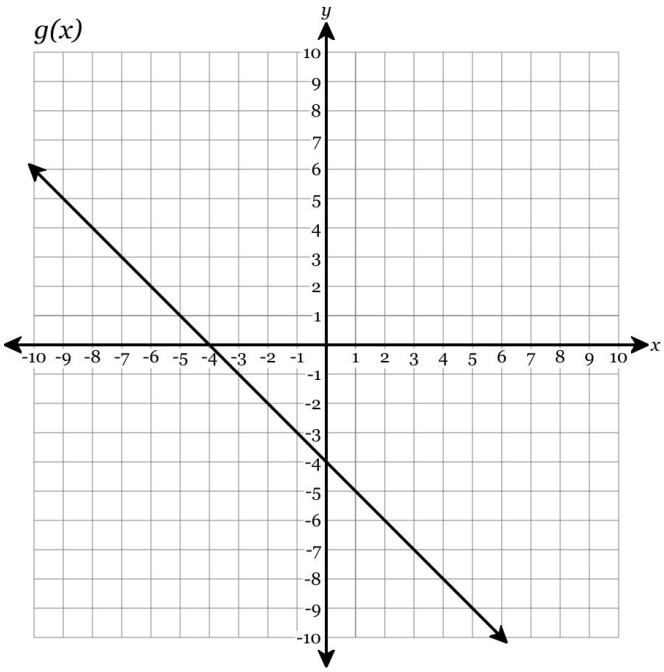
49. Find $f(-5)$.



$$h(x) = -3x - 3$$

x	$f(x)$
-4	-6
8	-8
-5	-8
-1	0
7	-6

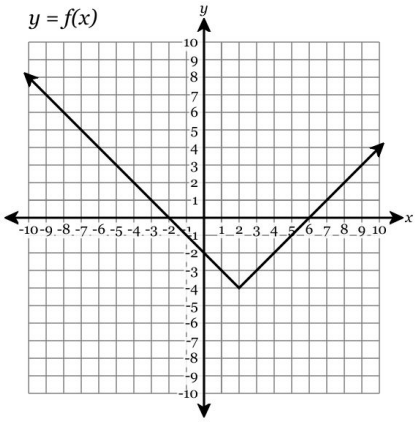
50. Find $f(5)$.



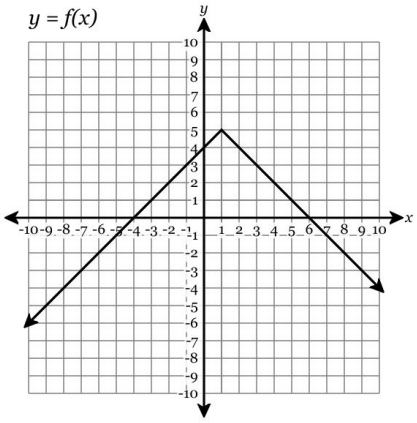
$$f(x) = -x^2 + 4x - 4$$

x	$h(x)$
3	10
-2	-7
-3	-8
2	7
10	-7

51. Find the value of $f(-8)$.



52. Find the value of $f(-9)$.



53. Given that $f(x) = x^2 + 5x - 36$ and $g(x) = x + 9$, find $(f - g)(x)$ and express the result as a polynomial in simplest form.

54. Given that $f(x) = x^2 + 2x - 8$ and $g(x) = x + 4$, find $f(x) + g(x)$ and express the result as a polynomial in simplest form.

55. Simplify the expression to a + bi form:

$$(11 + 8i) - (-4 + 8i)$$

56. Simplify the expression to a + bi form:

$$(5 + i) + (-1 + 2i)$$

57. Express the following fraction in simplest form using only positive exponents.

$$\frac{3(z^2)^2}{12z^7}$$

58. Express the following fraction in simplest form using only positive exponents.

$$\frac{(4k^5)^2}{4k^5}$$

59. Write the expression in radical form.

$$x^{\frac{2}{5}}$$

60. Write the expression in exponential form.

$$\sqrt[5]{x}$$

61. Evaluate the left hand side to find the value of a in the equation in simplest form.

$$\left(x^5\right)^{\frac{1}{2}} = x^a$$

62. Evaluate the left hand side to find the value of a in the equation in simplest form.

$$x^{\frac{1}{3}} x^{\frac{3}{2}} = x^a$$

63. Select the expression that is equivalent to $\frac{1}{(3x^2-5)^{-\frac{5}{4}}}$

A. $\frac{1}{\sqrt[4]{(3x^2-5)^5}}$ B. $\frac{1}{\sqrt[5]{(3x^2-5)^4}}$

C. $\sqrt[4]{(3x^2-5)^5}$ D. $\sqrt[5]{(3x^2-5)^4}$

64. Select the expression that is equivalent to $6x^{\frac{5}{2}}$

A. $\sqrt{6x^5}$ B. $6\sqrt[5]{x^2}$ C. $6\sqrt{x^5}$ D. $\sqrt[5]{6x^2}$

65. Express $100^{\frac{1}{2}}$ in simplest radical form.

66. Express $18^{\frac{2}{3}}$ in simplest radical form.

67. Assuming x and y are both positive, write the following expression in simplest radical form.

$$\sqrt{50x^6y^4}$$

68. Assuming x and y are both positive, write the following expression in simplest radical form.

$$\sqrt{4x^3y^6}$$

69. Express in simplest radical form: $\sqrt{28}$

70. Express in simplest radical form: $\sqrt{48}$

71. Express in simplest form with a rational denominator.

$$\frac{5}{\sqrt{12}}$$

72. Express in simplest form with a rational denominator.

$$\frac{3}{\sqrt{3}}$$

73. For the function $f(x) = \frac{x^5}{8}$, find $f^{-1}(x)$.

A. $f^{-1}(x) = \sqrt[5]{(8x)}$

B. $f^{-1}(x) = 8x^5$

C. $f^{-1}(x) = \sqrt[5]{\left(\frac{x}{8}\right)}$

D. $f^{-1}(x) = \frac{\sqrt[5]{x}}{8}$

74. For the function $f(x) = x^3 + 10$, find $f^{-1}(x)$.

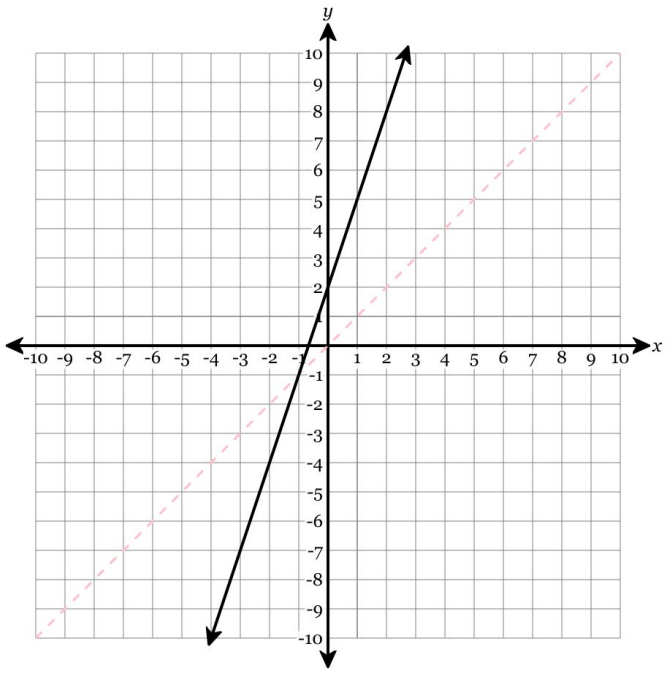
A. $f^{-1}(x) = \sqrt[3]{x - 10}$

B. $f^{-1}(x) = \sqrt[3]{x} + 10$

C. $f^{-1}(x) = (x - 10)^3$

D. $f^{-1}(x) = \sqrt[3]{x + 10}$

75. Graph the inverse of the provided graph on the accompanying set of axes. You must plot at least 5 points.



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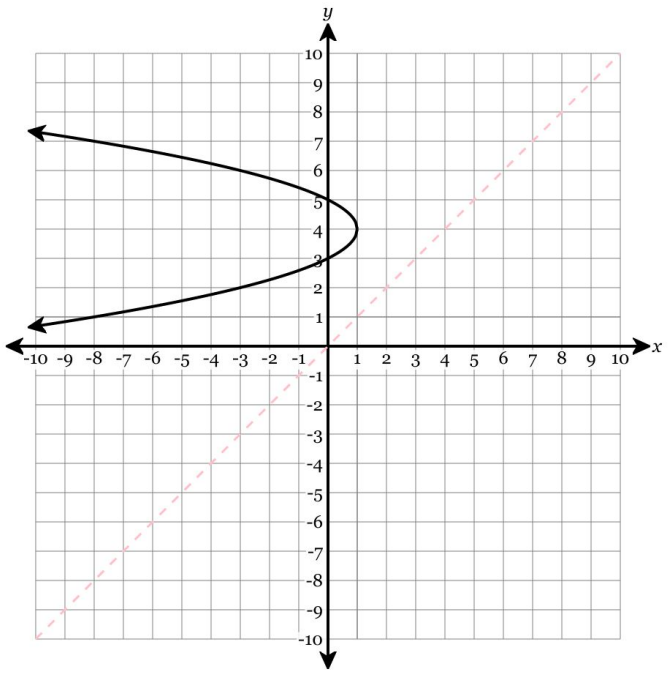


77. Solve for all values of x:

$$-2+\frac{4}{x+9}=-\frac{4x}{x+9}$$

78. Solve for all values of x:

$$\frac{x}{x+5}+5=-\frac{5}{x+5}$$

79. Simplify the expression completely if possible.

$$\frac{x^2+8x+7}{x^2-49}$$

80. Simplify the expression completely if possible.

$$\frac{4x^2}{16x^2+112x}$$

81. Simplify the following expression completely.

$$\frac{x^2+6x-7}{x^2+10x+21}$$

82. Simplify the following expression completely.

$$\frac{x^2+6x+9}{x^2+2x-3}$$

83. Find the common difference of the arithmetic sequence $-13, -4, 5, \ldots$

84. Find the common ratio of the geometric sequence $-6, -54, -486, \ldots$

85. The first three terms of a sequence are given. Write your answer as a decimal or whole number. Round to the nearest *thousandth* (if necessary).

$$155, 152, 149, ...$$

Find the 37th term.

86. The first three terms of a sequence are given. Write your answer as a decimal or whole number. Round to the nearest *thousandth* (if necessary).

$$16, 8, 4, ...$$

Find the 10th term.

87. An element with mass 980 grams decays by 27.8% per minute. How much of the element is remaining after 8 minutes, *to the nearest 10th of a gram*?

88. An element with mass 480 grams decays by 15.9% per minute. How much of the element is remaining after 10 minutes, *to the nearest 10th of a gram*?

89. Given the definitions of $f(x)$ and $g(x)$ below, find the value of $g(f(-8))$.

$$f(x) = -x - 4$$
$$g(x) = 2x^2 + 2x + 14$$

90. Given the definitions of $f(x)$ and $g(x)$ below, find the value of $(g \circ f)(-4)$.

$$f(x) = x + 5$$
$$g(x) = x^2 + 2x + 11$$

91. Solve the following inequality for g. Write your answer in simplest form.

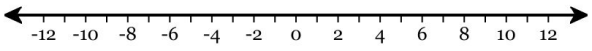
$$9g + 2 > 10g + 1$$

92. Solve the following inequality for f. Write your answer in simplest form.

$$7f + 7 > 3f - 4$$

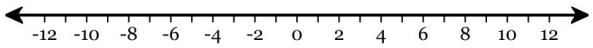
93. Solve for x and graph the solution on the number line below.

$$3x - 3 \leq 18 \quad \text{or} \quad 3x - 3 > 33$$



94. Solve for x and graph the solution on the number line below.

$$11 > -2x + 1 \quad \text{and} \quad -21 \leq -2x + 1$$



95. Solve the following inequality *algebraically*.

$$|x - 5| \geq 9$$

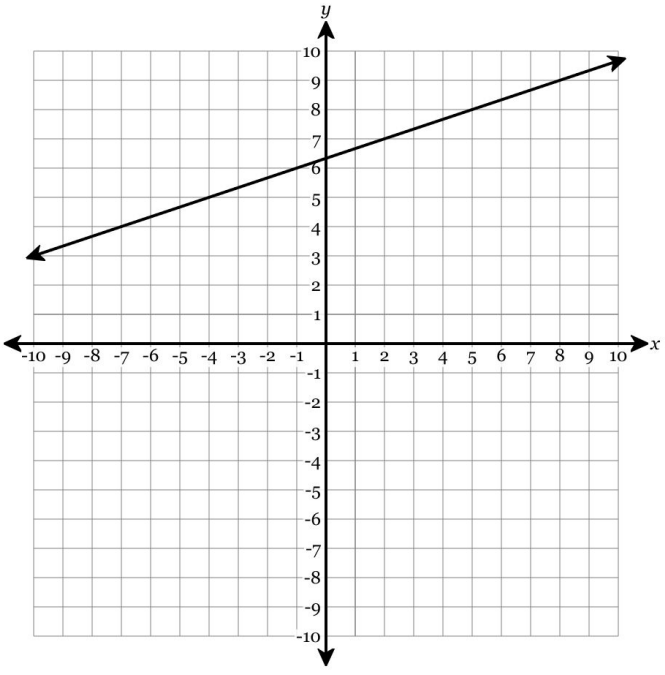
96. Solve the following inequality *algebraically*.

$$|x - 8| > 8$$

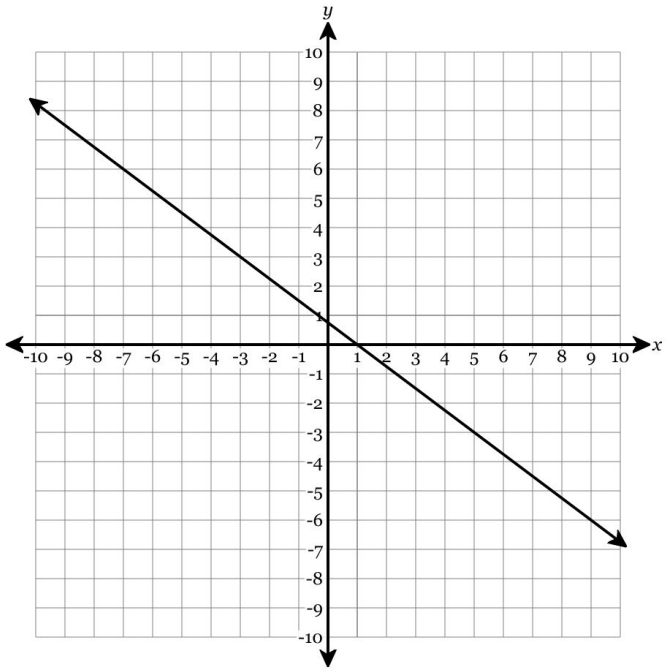
97. What is the slope of the line that passes through the points $(-9, 5)$ and $(-9, 0)$? Write your answer in *simplest form*.

98. What is the slope of the line that passes through the points $(-5, 9)$ and $(-2, 9)$? Write your answer in *simplest form*.

99. Draw a line representing the "rise" and a line representing the "run" of the line. State the slope of the line in simplest form.



100. Draw a line representing the "rise" and a line representing the "run" of the line. State the slope of the line in simplest form.



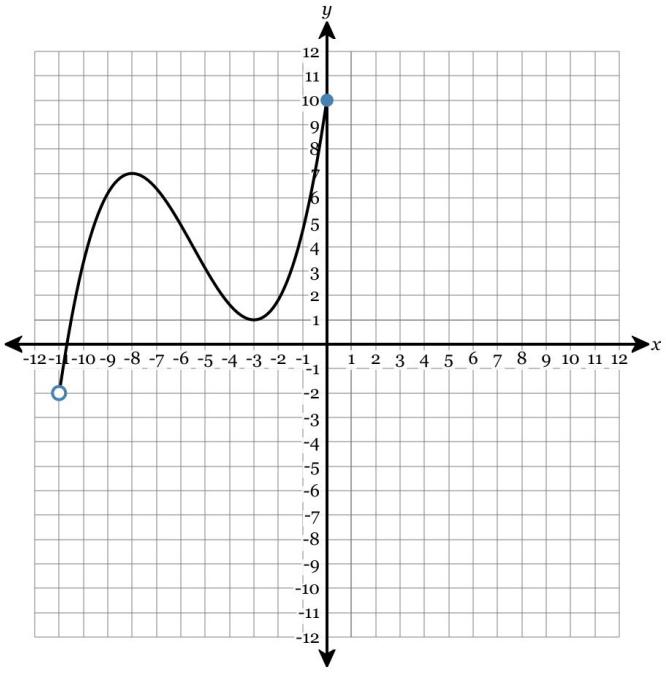
101. What is the equation of the line that passes through the point $(-1, -2)$ and has a slope of 3?

102. What is the equation of the line that passes through the point $(-3, -4)$ and has a slope of 0?

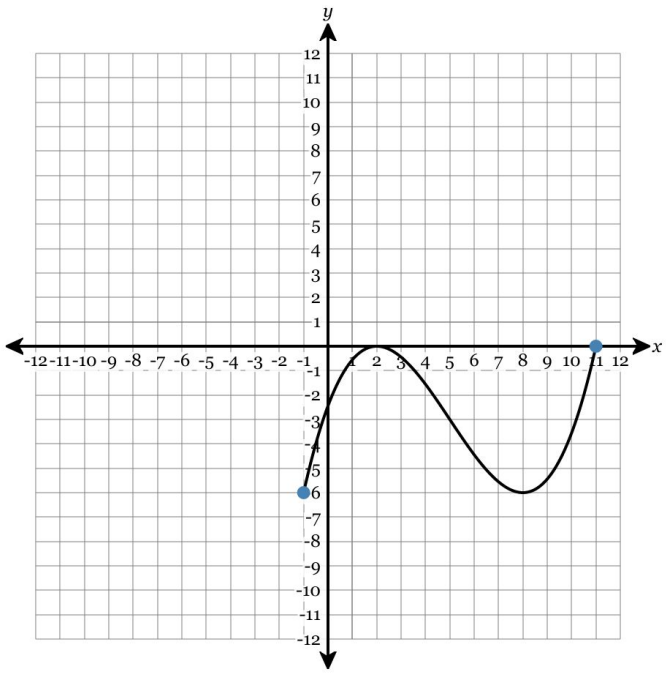
103. What is an equation of the line that passes through the points $(-4, -2)$ and $(8, 4)$?

104. What is an equation of the line that passes through the points $(8, 8)$ and $(4, 8)$?

105. Determine the domain of the following graph:



106. Determine the range of the following graph:



107. Combine like terms.

$$-y^3 + 4 + y^3 + 7x^2 + 3 - 5y^3 + 3$$

108. Combine like terms.

$$2 - x^3 - 4 + 3y + y + y + 5$$