1. Solve the compound inequality.

\[-5 < 2x - 3 \leq 3\]

Graph the solution on the number line.

2. Solve the compound inequality.

\[4y + 6 \leq 30 \quad \text{and} \quad 3y - 4 < -1\]

Write the solution in interval notation.

If there is no solution, enter \(\emptyset\).

3. Solve for \(v\).

\[|2v - 5| + 8 = 29\]
4. Graph the solution to the inequality on the number line.

\[ |5y - 10| \geq 5 \]

5. Solve.

\[ 3|y - 8| + 2 > 11 \]

6. Find an equation for the line below.
7. Write equations for the horizontal and vertical lines passing through the point \((-9, 3)\).

   horizontal line: \\
   vertical line: \\

8. Consider the line \(y = -\frac{5}{3}x + 5\).

   (a) Find the equation of the line that is perpendicular to this line and passes through the point \((-5, -4)\).

   (b) Find the equation of the line that is parallel to this line and passes through the point \((-5, -4)\).

9. Suppose that the relation \(H\) is defined as follows.

   \[
   H = \{(2, 0), (8, -1), (-6, -1)\}
   \]

   Give the domain and range of \(H\).
   Write your answers using set notation.

10. Find the domain of the function.

    \[
    v(x) = \sqrt{-x + 5}
    \]

    Write your answer using interval notation.
11. Suppose that a household's monthly water bill (in dollars) is a linear function of the amount of water the household uses (in hundreds of cubic feet, HCF). When graphed, the function gives a line with a slope of 1.55. See the figure below.

If the monthly cost for 22 HCF is $47.94, what is the monthly cost for 18 HCF?

12. Use substitution to solve the system.

\[ y = 3x - 9 \]
\[ 2x + 5y = 23 \]

\[ x = \phantom{0} \]
\[ y = \phantom{0} \]

13. A chemical company makes two brands of antifreeze. The first brand is 40% pure antifreeze, and the second brand is 65% pure antifreeze. In order to obtain 70 gallons of a mixture that contains 55% pure antifreeze, how many gallons of each brand of antifreeze must be used?

First brand: _____ gallons
Second brand: _____ gallons
14. Solve the following system of equations.

\[-3x - 4y = 11\]
\[-5x - 3y = 0\]

15. A party rental company has chairs and tables for rent. The total cost to rent 3 chairs and 5 tables is $47. The total cost to rent 12 chairs and 2 tables is $35. What is the cost to rent each chair and each table?

16. Factor.

\[27v^3 - 64\]

17. Solve for \(w\).

\[5w^2 + 2 = -11w\]

18. Solve for \(y\).

\[(y + 5)^2 = 2y^2 + 4y + 30\]

If there is more than one solution, separate them with commas.

19. The area of a rectangle is 65 ft\(^2\), and the length of the rectangle is 3 ft less than twice the width. Find the dimensions of the rectangle.
20. For the following right triangle, find the side length $x$. Round your answer to the nearest hundredth.

![Right Triangle Diagram]

21. Find all excluded values for the expression. That is, find all values of $u$ for which the expression is undefined.

$$\frac{u - 10}{u - 5}$$

If there is more than one value, separate them with commas.

22. The function $g$ is defined below.

$$g(x) = \frac{x^2 + 4x - 21}{x^2 - 4}$$

Find all values of $x$ that are NOT in the domain of $g$. If there is more than one value, separate them with commas.

23. Multiply.

$$\frac{25x^2 - 49}{3x^2 + x - 14} \cdot \frac{4x - 8}{5x + 7}$$

Simplify your answer as much as possible.
24. Multiply.

\[
\frac{x - 3}{2x - 18} \cdot \frac{4x - 36}{3x - 9}
\]

Simplify your answer as much as possible.

25. Divide.

\[
\frac{x + 2}{x^2 - 4x + 3} \div \frac{4x + 8}{x^2 - 3x + 2}
\]

Simplify your answer as much as possible.


\[
\frac{x^2 - 10xy + 16y^2}{x^2 - 25y^2} \div \frac{4x - 32y}{x + 5y}
\]

Simplify your answer as much as possible.

27. Add.

\[
\frac{5}{x + 3} + \frac{6}{x - 2}
\]

Simplify your answer as much as possible.

28. Subtract.

\[
\frac{x + 6}{x - 2} - \frac{x - 7}{x}
\]

Simplify your answer as much as possible.
29. Subtract.

\[
\frac{3}{5x - 4} - \frac{2}{4 - 5x}
\]

Simplify your answer as much as possible.

30. Add.

\[
\frac{2}{3x^2 - 2x - 8} + \frac{1}{3x^2 + 13x + 12}
\]

Simplify your answer as much as possible.

31. Simplify.

\[
\frac{\frac{u - 3}{4u}}{\frac{u^2 - 6u + 9}{7u^2}}
\]

32. Simplify.

\[
\frac{\frac{2}{x - 4} + 1}{x + \frac{4}{x - 4}}
\]
33. Simplify.

\[
\frac{3 - \frac{3}{y - 7}}{1 - \frac{y - 5}{3y - 21}}
\]

34. Simplify.

\[
\frac{\frac{3}{vu^2}}{\frac{1}{u} - \frac{5}{v^2}}
\]

35. Simplify.

\[
\frac{1}{a^{-2} + b}
\]

Write your answer using only positive exponents.

36. Divide.

\[
\left(9x^3 + 9x^2 + 14x + 6\right) \div (3x + 1)
\]

Your answer should give the quotient and the remainder.

Quotient:

Remainder:
37. Divide.

\[(5x^2 + 40x + 37) \div (x + 7)\]

Your answer should give the quotient and the remainder.

Quotient:

Remainder:

38. Use synthetic division to find the quotient and remainder when \(-8x^3 + 21x^2 - 20\) is divided by \(x - 2\). Specifically, complete the synthetic division table below, and write your answer in the following form: \(\text{Quotient} + \frac{\text{Remainder}}{x - 2}\).

\[
\begin{array}{c|cccc}
2 & -8 & 21 & 0 & -20 \\
\hline
 & & & & \\
\end{array}
\]

\[
-8x^3 + 21x^2 - 20 \div (x - 2) = \square + \frac{\square}{x - 2}
\]

39. Solve for \(x\).

\[
\frac{-28}{x - 2} = \frac{-20}{x}
\]
40. Solve for v.

\[- \frac{4}{v-5} = \frac{1}{2v-10} + 2\]

41. Solve for y.

\[\frac{1}{y-4} + \frac{3}{y+2} = \frac{10}{y^2 - 2y - 8}\]

42. Solve for x.

\[\frac{x}{5x+12} = \frac{-2}{x}\]

43. Solve for y.

\[\frac{y-5}{y-1} + 1 = \frac{y-3}{y+2}\]

44. Solve for d.

\[a = \frac{b+4}{c+d}\]
45. Solve for $c$.

\[ \frac{9}{b} = d - \frac{5}{c} \]

46. Working together, it takes two different sized hoses 20 minutes to fill a small swimming pool. If it takes 25 minutes for the larger hose to fill the swimming pool by itself, how long will it take the smaller hose to fill the pool on its own?

Do not do any rounding.

47. Ahmad's boat has a top speed of 12 miles per hour in still water. While traveling on a river at top speed, he went 20 miles upstream in the same amount of time he went 40 miles downstream. Find the rate of the river current.

48. Simplify.

\[ \sqrt{128} \]

49. Simplify.

\[ \sqrt{20t^{10}u^{3}} \]

Assume that all variables represent positive real numbers.

50. Write the following in simplified radical form.

\[ \sqrt[3]{32} \]
51. Write the following as an exponential expression.

\[
\frac{8}{\sqrt[3]{v}}
\]

52. Evaluate.

\[
\frac{1}{81^{\frac{4}{3}}} = \_\_
\]

\[
\frac{1}{125^{\frac{3}{2}}} = \_\_
\]

53. Simplify. Write your answers without exponents.

\[
\left(\frac{1}{25}\right)^{-\frac{3}{2}} = \_
\]

\[
8^{-\frac{4}{3}} = \_
\]

54. Simplify as much as possible.

\[
x\sqrt{75u^5} - 2u^2\sqrt{3ux^2}
\]

Assume that all variables represent positive real numbers.
55. Simplify.

\[-3\sqrt{54} - 4 \sqrt{16}\]

56. Simplify.

\[\sqrt{80} \times 2\sqrt{20}\]

57. Simplify.

\[\sqrt{15y^6x^2 \cdot 5yx^3}\]

Assume that all variables represent positive real numbers.

58. Simplify.

\[\frac{\sqrt{28} - 4}{12}\]

59. Rationalize the denominator and simplify.

\[\frac{-3}{7 + 3\sqrt{y}}\]

Assume that the variable represents a positive real number.
60. Rationalize the denominator and simplify.

\[
\frac{-3}{7 + 3\sqrt{2}}
\]
1. Equation of a horizontal line: 
   \[ y = 1 \]

2. \((-\infty, 1)\)

3. \(v = 13, -8\)

4. Equation of a vertical line: 
   \[ x = -9 \]

5. \(y < 5 \) or \(y > 11\)

6. \[ y = \frac{8}{3}x + \frac{25}{3} \]

7. Horizontal line: \(y = 3\)
   Vertical line: \(x = -9\)

8. Equation of perpendicular line: 
   \[ y = \frac{3}{5}x - 1 \]
   Equation of parallel line: 
   \[ y = -\frac{5}{3}x - \frac{37}{3} \]

9. Domain = \(\{2, 8, -6\}\)
   Range = \(\{0, -1\}\)
10. \((-\infty, 5]\)

11. $41.74$

12. \(x = 4\)
    \[y = 3\]

13. First brand: 28 gallons
    Second brand: 42 gallons

14. \(x = 3\)
    \[y = -5\]

15. Cost to rent each chair: $1.50
    Cost to rent each table: $8.50

16. \((3v - 4)(9v^2 + 12v + 16)\)

17. \(-\frac{1}{5}, -2\)

18. \(y = 1, 5\)

19. Length: 10 ft
    Width: 6.5 ft

20. 12.12

21. \(u = 5\)

22. \(x = 2, -2\)

23. \[\frac{4(5x - 7)}{3x + 7}\]
24. \( \frac{2}{3} \)

25. \( \frac{x - 2}{4(x - 3)} \)

26. \( \frac{x - 2y}{4(x - 5y)} \)

27. \( \frac{11x + 8}{(x + 3)(x - 2)} \)

28. \( \frac{15x - 14}{x(x - 2)} \)

29. \( \frac{5}{5x - 4} \)

30. \( \frac{1}{(x + 3)(x - 2)} \)

31. \( \frac{7u}{4(u - 3)} \)

32. \( \frac{1}{x - 2} \)

33. \( \frac{9}{2} \)

34. \( \frac{3v}{u(v^2 - 5u)} \)

35. \( \frac{a^2}{1 + ba^2} \)
36. Quotient: \(3x^2 + 2x + 4\)  
   Remainder: 2

37. Quotient: \(5x + 5\)  
   Remainder: 2

38. \[ \begin{array}{c|cccc}
    & -8 & 21 & 0 & -20 \\
\hline
    & -16 & 10 & 20 & \\
  \hline
  \end{array} \]

   \[ \frac{-8x^3 + 21x^2 - 20}{x - 2} = -8x^2 + 5x + 10 + \frac{0}{x - 2}. \]

39. \(x = -5\)

40. \(v = \frac{11}{4}\)

41. \(y = 5\)

42. \(x = -6, \ -4\)

43. \(y = 3, \ -5\)

44. \(d = \frac{b + 4}{a} - c\)

45. \(c = -\frac{5b}{9 - bd}\)

46. 100 minutes

47. Rate of the river current: 4 miles/hour

48. \(8\sqrt{2}\)
49. \(2t^5u \sqrt{5u}\)

50. \(2 \sqrt[3]{4}\)

51. \(\frac{3}{\sqrt[8]{v}}\)

52. \(\frac{1}{81^{\frac{4}{3}}} = 3\)
\(\frac{1}{125^{\frac{3}{5}}} = 5\)

53. \(\left(\frac{1}{25}\right)^{\frac{3}{2}} = 125\)
\(8^{\frac{4}{3}} = \frac{1}{16}\)

54. \(3u^2 x \sqrt{3u}\)

55. \(-11 \sqrt[3]{2}\)

56. 80

57. \(5y^3 x^2 \sqrt[3]{3yx}\)

58. \(\frac{\sqrt{7} - 2}{6}\)

59. \(\frac{-21 + 9\sqrt{y}}{49-9y}\)

60. \(\frac{-21 + 9\sqrt{2}}{31}\)