1. Fill in the blank to correctly complete the sentence.

   The solution set of the following system is $\{(2,\_\_\_\_\_)\}$.

   $$\begin{aligned} -4x + 5y &= 22 \\ x + y &= 8 \end{aligned}$$

---

2. Fill in the blank to correctly complete the sentence.

   The solution set of the following system is $\{(\_\_\_\_\_,0)\}$. (Simplify your answer.)

   $$\begin{aligned} 4x + y &= 16 \\ 13x + y &= 52 \end{aligned}$$

---

3. Fill in the blank to correctly complete the sentence.

   One way of solving the following system by elimination is to multiply equation (2) by the integer _____ to eliminate the y-terms by direct addition.

   $$\begin{aligned} 12x + 17y &= 83 \quad (1) \\ 3x + y &= 18 \quad (2) \end{aligned}$$

---

4. Select the correct choice that completes the sentence below.

   To solve the system

   $$\begin{aligned} 5x + y &= 3 \quad (1) \\ 7x + 8y &= -9 \quad (2) \end{aligned}$$

   by substitution, it is easiest to begin by solving equation (1) for the variable (1) _____ and then substituting into equation (2), because no fractions will appear in the algebraic work.

   (1)
   - ○ y
   - ○ x

---

5. Select the correct choice that completes the sentence below.

   If a system of linear equations in two variables has two graphs that coincide, there is/are (1) _____ solution(s) to the system.

   (1)
   - ○ no
   - ○ infinitely many
   - ○ one

---

6. Select the correct choice that completes the sentence below.

   If a system of linear equations in two variables has two graphs that are parallel lines, there is/are (1) _____ solution(s) to the system.

   (1)
   - ○ no
   - ○ infinitely many
   - ○ one

---

7. Solve the system of equations using substitution.

$$2x + y = 24$$
$$y = 4x$$

The solution set is $\{\quad\}$.
(Simplify your answer. Type an ordered pair.)

8. Solve the system by substitution.

$$6x + 4y = -20$$
$$-7x + y = 63$$

The solution set is $\{\quad\}$.
(Simplify your answer. Type an ordered pair.)

9. Solve by the elimination method.

$$4x - y = 30$$
$$x + 3y = 27$$

The solution set is $\{\quad\}$.
(Simplify your answer. Type an ordered pair.)

10. Use the elimination method to solve the system of equations.

$$2x - 3y = 19$$
$$3x + 7y = 17$$

The solution set is $\{\quad\}$.
(Simplify your answer. Type an ordered pair.)

11. Solve the system by elimination.

$$2x + 3y = 1$$
$$6x - 7y = 51$$

The solution set is $\{\quad\}$.
(Simplify your answer. Type an ordered pair.)

12. Solve the system. State whether the system is inconsistent or has infinitely many solutions. If the system has infinitely many solutions, write the solution set with y arbitrary.

$$54x - 6y = 24$$
$$-9x + y = 4$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** There is one solution. The solution set is $\{\quad\}$.
  (Simplify your answer. Type an ordered pair.)
- **B.** The system has infinitely many solutions. The solution set is $\{\quad\}$.
  (Simplify your answer. Type an ordered pair. Type an expression using y as the variable.)
- **C.** The solution is the empty set.

13. Solve the system. State whether the system is inconsistent or has infinitely many solutions. If the system has infinitely many solutions, write the solution set with y arbitrary.

$$\begin{aligned} 2x - 3y &= 2 \\ -4x + 6y &= -4 \end{aligned}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** There is one solution. The solution set is $\{$ ____ $\}$.
  (Simplify your answer. Type an ordered pair.)
- **B.** The system has infinitely many solutions. The solution set is $\{$ ____ $\}$.
  (Simplify your answer. Type an ordered pair. Type an expression using y as the variable.)
- **C.** The solution is the empty set.

14. Solve the system. State whether the system is inconsistent or has infinitely many solutions. If the system has infinitely many solutions, write the solution set with y arbitrary.

$$\begin{aligned} 5x + 6y &= 2 \\ 10x + 12y &= 4 \end{aligned}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** There is one solution. The solution set is $\{$ ____ $\}$.
  (Simplify your answer. Type an ordered pair.)
- **B.** The system has infinitely many solutions. The solution set is $\{$ ____ $\}$.
  (Simplify your answer. Type an ordered pair. Type an expression using y as the variable.)
- **C.** The solution is the empty set.

15. Solve the system. State whether the system is inconsistent or has infinitely many solutions. If the system has infinitely many solutions, write the solution set with y arbitrary.

$$\begin{aligned} 9x - 54y &= 0 \\ -4x + 24y &= 7 \end{aligned}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** There is one solution. The solution set is $\{$ ____ $\}$.
  (Simplify your answer. Type an ordered pair.)
- **B.** The system has infinitely many solutions. The solution set is $\{$ ____ $\}$.
  (Simplify your answer. Type an ordered pair. Type an expression using y as the variable.)
- **C.** The system is inconsistent.

16. For what value(s) of k will the following system of linear equations have no solution? infinitely many solutions?

$$\begin{aligned} x - 4y &= 6 \\ -2x + 8y &= k \end{aligned}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The given system has no solution for all real numbers k except for k = _____.
  (Use a comma to separate answers as needed.)
- **B.** The given system has no solution for all real numbers k.
- **C.** The given system has a solution for all real values k.

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The given system has infinitely many solutions for k = _____.
  (Use a comma to separate answers as needed.)
- **B.** The given system has infinitely many solutions for all real numbers k except for k = _____.
- **C.** The given system has infinitely many solutions for all real numbers k.

17. How many rows and how many columns does this matrix have? What is its dimension?

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & -2 & -3 \end{bmatrix}$$

The matrix has _____ row(s) and _____ column(s).

The dimension of the matrix is _____ × _____.

18. What is the element in the second row, first column of the matrix $\begin{bmatrix} 2 & 4 \\ 6 & 8 \\ 10 & 12 \\ 14 & 16 \end{bmatrix}$?

The element in the second row, first column of the matrix is _____.

19. What is the augmented matrix of the following system?

$$\begin{aligned} -3x + 4y &= 2 \\ 12x + 2y &= 7 \end{aligned}$$

The augmented matrix of the given system is $\left[\begin{array}{cc|c} \_\_\_\_ & \_\_\_\_ & \_\_\_\_ \\ \_\_\_\_ & \_\_\_\_ & \_\_\_\_ \end{array}\right]$.

20. By what number must the first row of the augmented matrix $\left[\begin{array}{cc|c} -3 & 5 & 2 \\ 6 & 2 & 5 \end{array}\right]$ be multiplied so that when it is added to the second row, the element in the second row, first column becomes 0?

The first row must be multiplied by _____.

21. What is the augmented matrix of the following system?

$$\begin{aligned} 2x + 3y &= 5 \\ -8x + 12z &= 3 \\ -9y + z &= 4 \end{aligned}$$

The augmented matrix of the given system is $\left[\begin{array}{ccc|c} \_\_\_ & \_\_\_ & \_\_\_ & \_\_\_ \\ \_\_\_ & \_\_\_ & \_\_\_ & \_\_\_ \\ \_\_\_ & \_\_\_ & \_\_\_ & \_\_\_ \end{array}\right]$.

22. By what number must the first row of the augmented matrix $\left[\begin{array}{ccc|c} 3 & 2 & 0 & 4 \\ -6 & 0 & 4 & 2 \\ 0 & -8 & 3 & 5 \end{array}\right]$ be multiplied so that when it is added to the second row, the element in the second row, first column becomes 0?

The first row must be multiplied by _____.

23. Write an augmented matrix for the following system of equations and give its size.

$$\begin{aligned} -8x + 4y &= 4 \\ 7x - 6y &= 3 \end{aligned}$$

What is the augmented matrix?

$\left[\begin{array}{cc|c} \_\_\_ & \_\_\_ & \_\_\_ \\ \_\_\_ & \_\_\_ & \_\_\_ \end{array}\right]$

What is the size of the matrix?

○ **A.** 2×2 ○ **B.** 3×2 ○ **C.** 3×3 ○ **D.** 2×3

24. Write the system of equations associated with the given augmented matrix. Do not solve.

$$\left[\begin{array}{ccc|c} 2 & 6 & 1 & 4 \\ 0 & 3 & 5 & 16 \\ -1 & 2 & 5 & 14 \end{array}\right]$$

Choose the correct answer below.

- **A.** $2x + 6y + z = 4$
  $x + 3y + 5z = 14$
  $-x + 2y + 5z = 16$
- **B.** $2x - z = 4$
  $6x + 3y + 2z = 16$
  $x + 5y + 5z = 14$
- **C.** $2x + 6y + z = 4$
  $3y + 5z = 16$
  $-x + 2y + 5z = 14$
- **D.** $2x + 6y + z = 16$
  $3y + 5z = 4$
  $-x + 2y + 5z = 14$

25. Write the system of equations associated with the augmented matrix. Do not solve.

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 8 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 4 \end{array}\right]$$

Complete the system shown below. Use the letters x, y, and z to represent the terms from the first, second, and third columns of the matrix, respectively.

_____ = 8
_____ = 5
_____ = 4
(Simplify your answer.)

26. Use the Gauss-Jordan method to solve the system of equations. If the system has infinitely many solutions, give the solution with z arbitrary.

$x + y - 5z = -21$
$3x - 3y + 2z = 0$
$x + 3y - 5z = -25$

Select the correct choice below and fill in any answer boxes within your choice.

- **A.** There is one solution. The solution set is $\{(\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_)\}$.
  (Simplify your answers.)
- **B.** There are infinitely many solutions. The solution set is $\{(\_\_\_\_\_, \_\_\_\_\_, z)\}$, where z is any real number.
  (Simplify your your answers. Type expressions using z as the variable.)
- **C.** The system is inconsistent. The solution set is $\varnothing$.

27. Use the Gauss-Jordan method to solve the system of equations. If the system has infinitely many solutions, give the solution with z arbitrary.

$$y = -5x - 5z + 13$$
$$x = -2y - z + 17$$
$$z = x - y$$

Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.

- **A.** The solution set is $\{(\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_)\}$. (Type an exact answer in simplified form.)
- **B.** The solution set is $\{(\_\_\_\_\_, \_\_\_\_\_, z)\}$
(Type an expression involving z for each coordinate where z represents all real numbers. Type an exact answer in simplified form.)
- **C.** The solution set is $\varnothing$.

28. Use the Gauss-Jordan method to solve the system of equations. If the system has infinitely many solutions, give the solution with z arbitrary.

$$2x - y + 3z = -5$$
$$x + 2y - 2z = 13$$
$$10y + 5z = 5$$

Select the correct choice below and fill in any answer boxes within your choice.

- **A.** There is one solution. The solution set is $\{(\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_)\}$.
(Simplify your answers.)
- **B.** There are infinitely many solutions. The solution set is $\{(\_\_\_\_\_, \_\_\_\_\_, z)\}$, where z is any real number.
(Simplify your your answers. Type expressions using z as the variable.)
- **C.** The system is inconsistent. The solution set is $\varnothing$.

29. Use the Gauss-Jordan method to solve the system of equations. If the system has infinitely many solutions, give the solution with z arbitrary.

$$5x + 3y - 3z + 2 = 0$$
$$2x - y + 2z - 4 = 0$$
$$-10x - 6y + 6z = 0$$

Select the correct choice below and fill in any answer boxes within your choice.

- **A.** There is one solution. The solution set is $\{(\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_)\}$.
(Simplify your answers.)
- **B.** There are infinitely many solutions. The solution set is $\{(\_\_\_\_\_, \_\_\_\_\_, z)\}$, where z is any real number.
(Simplify your your answers. Type expressions using z as the variable.)
- **C.** The solution set is $\varnothing$.

30. Find the value of the determinant.

$$\begin{vmatrix} -2 & 6 \\ 1 & -9 \end{vmatrix}$$

The determinant value is _____.
(Simplify your answer.)

31. Find the value of the determinant.

$$\begin{vmatrix} 1 & 3 \\ 3 & 9 \end{vmatrix}$$

The determinant value is _____.

32. Find the value of the determinant.

$$\begin{vmatrix} 3 & 4 & 4 \\ 6 & 5 & 0 \\ 3 & 10 & 0 \end{vmatrix}$$

The determinant value is _____.

33. Find the value of the determinant.

$$\begin{vmatrix} 4 & 0 & 4 \\ -4 & 9 & -4 \\ 6 & 10 & 6 \end{vmatrix}$$

The determinant value is _____.

34. Use Cramer's Rule to solve the system of equations. If D = 0, use another method to determine the solution set.

$$x + y = 8$$
$$x - y = 6$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The solution set is $\{$ _____ $\}$.
  (Simplify your answer. Type an ordered pair.)
- **B.** The system has infinitely many solutions. The solution set is $\{$ _____ $\}$.
  (Simplify your answer. Type an ordered pair.)
- **C.** The solution is the empty set.

35. Use Cramer's rule to solve the system of equations. If D = 0, use another method to determine the solution set.

$$2x + 2y = 9$$
$$6x + 6y = 27$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The solution set is $\{$ _____ $\}$.
  (Simplify your answer. Type an ordered pair.)
- **B.** The system has infinitely many solutions. The solution set is $\{$ _____ $\}$.
  (Simplify your answer. Type an ordered pair.)
- **C.** The solution is the empty set.

36. Use Cramer's rule to solve the system of equations. If D = 0, use another method to determine the solution set.

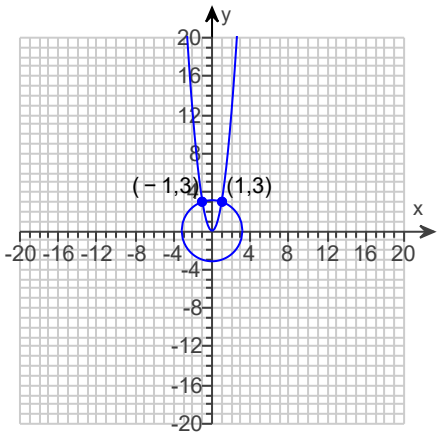
$$\begin{aligned} 3x - y + 5z &= -11 \\ 9x + 3y - z &= -69 \\ x + 5y + 3z &= 11 \end{aligned}$$

Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.

- **A.** There is one solution. The solution set is $\{(\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_)\}$.
  (Type integers or simplified fractions.)
- **B.** There are infinitely many solutions. The solution set is $\{(\_\_\_\_\_, \_\_\_\_\_, z)\}$, where z is any real number.
  (Simplify your answers. Use integers or fractions for any numbers in the expressions.)
- **C.** There is no solution. The solution set is $\varnothing$.

37. A nonlinear system is given, along with the graphs of both equations in the system. Verify that the points of intersection specified on the graph are solutions of the system by substituting directly into both equations.

$y = 3x^2$
$x^2 + y^2 = 10$



Substitute the coordinates of the point $(-1,3)$ in $y = 3x^2$.

$y = 3x^2$
_____ = _____ Substitute and simplify.

Substitute the coordinates of the point $(-1,3)$ in $x^2 + y^2 = 10$.

$x^2 + y^2 = 10$
_____ = 10 Substitute and simplify.

Substitute the coordinates of the point $(1,3)$ in $y = 3x^2$.

$y = 3x^2$
_____ = _____ Substitute and simplify.

Substitute the coordinates of the point $(1,3)$ in $x^2 + y^2 = 10$.

$x^2 + y^2 = 10$
_____ = 10 Substitute and simplify.

Are the points of intersection specified on the graph the solutions to the given system? Choose the correct answer below.

- **A.** No, because both the points of intersection do not satisfy the given system.
- **B.** Yes, because both the points of intersection satisfy the given system.
- **C.** No, because both the points of intersection satisfy only $y = 3x^2$, but do not satisfy $x^2 + y^2 = 10$.
- **D.** No, because both the points of intersection satisfy only $x^2 + y^2 = 10$, but do not satisfy $y = 3x^2$.

38. Give all solutions of the nonlinear system of equations, including those with nonreal complex components.

$$x^2 - y = 0$$
$$3x + y = 18$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The solution set is $\{$ ____ $\}$.
  (Type an ordered pair. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression. Express complex numbers in terms of i. Use a comma to separate answers as needed.)
- **B.** There are infinitely many solutions.
- **C.** The solution is the empty set.

39. Give all solutions of the nonlinear system of equations, including those with nonreal complex components.

$$7x^2 + 7y^2 = 70$$
$$14x^2 + 14y^2 = 140$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- **A.** The solution set is $\{$ ____ $\}$.
  (Simplify your answer. Type an ordered pair. Type an exact answer, using radicals as needed. Express complex numbers in terms of i . Use a comma to separate answers as needed.)
- **B.** There are infinitely many solutions.
- **C.** The solution is the empty set.

40. Give all solutions of the nonlinear system of equations, including those with nonreal complex components.

$$xy = -15$$
$$2x + 5y = 5$$

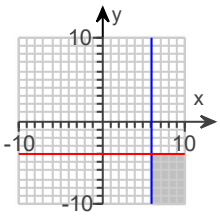
Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

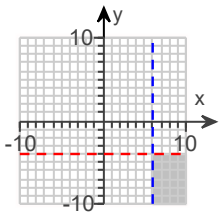
- **A.** The solution set is $\{$ ____ $\}$.
  (Simplify your answer. Type an ordered pair, using integers or fractions. Type an exact answer, using radicals as needed. Express complex numbers in terms of i. Use a comma to separate answers as needed.)
- **B.** There are infinitely many solutions.
- **C.** The solution is the empty set.

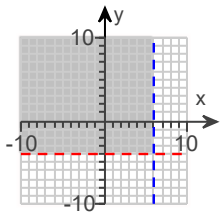
41. Match the system of inequalities with the correct graph.

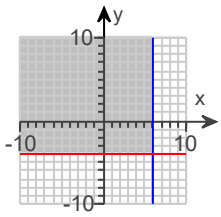
$x \geq 6$
$y \leq -4$

Choose the correct graph below.

A. 

B. 

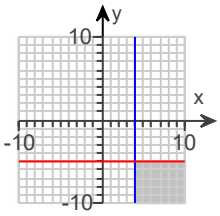
C. 

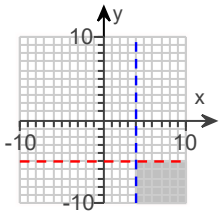
D. 

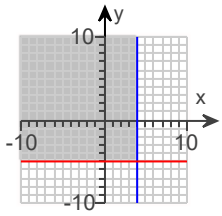
42. Match the system of inequalities with the correct graph.

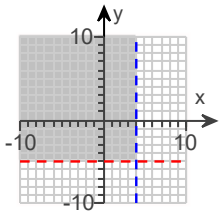
$x \leq 4$
$y \geq -5$

Choose the correct graph below.

A. 

B. 

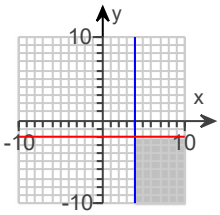
C. 

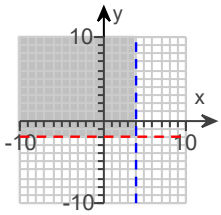
D. 

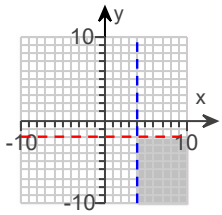
43. Match the system of inequalities with the correct graph.

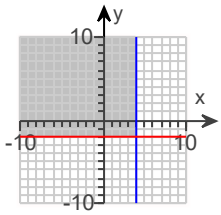
$x > 4$
$y < -2$

Choose the correct graph below.

A. 

B. 

C. 

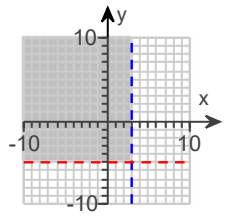
D. 

44. Match the system of inequalities with the correct graph.

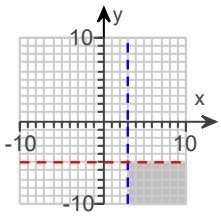
$x < 3$
$y > -5$

Choose the correct graph below.

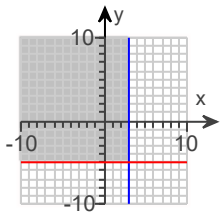
A.



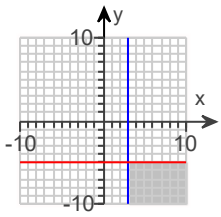
B.



C.



D.



45. Select the correct choice that completes the sentence below.

The test point (0, 0) (1) _____ satisfy the inequality $-2x - 5y \geq 12$.

(1) ○ does not
○ does

46. Select the correct choice that completes the sentence below.

Any point that lies on the graph of $-3x - 4y = 12$ (1) _____ lie on the graph of $-3x - 4y > 12$.

(1) ○ does
○ does not

47. What are the coordinates of the point of intersection of the boundary lines in the following system?

$x \geq 2$
$y \leq -3$

The coordinates of the point of intersection of the boundary lines in the given system are _____.

48. Select the correct choice that completes the sentence below.

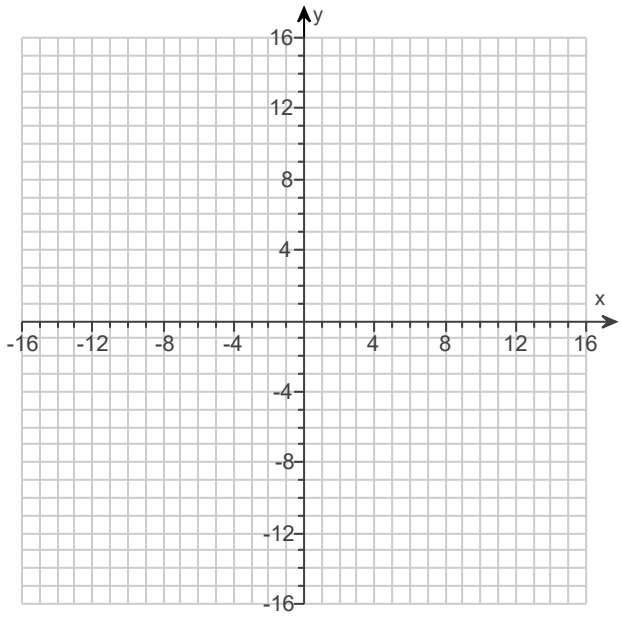
The graph of $2x - 3y < 20$ has a (1) _____ boundary line.

(1) ○ solid
○ dashed

49. Graph the inequality.

$x - 2y \leq 10$

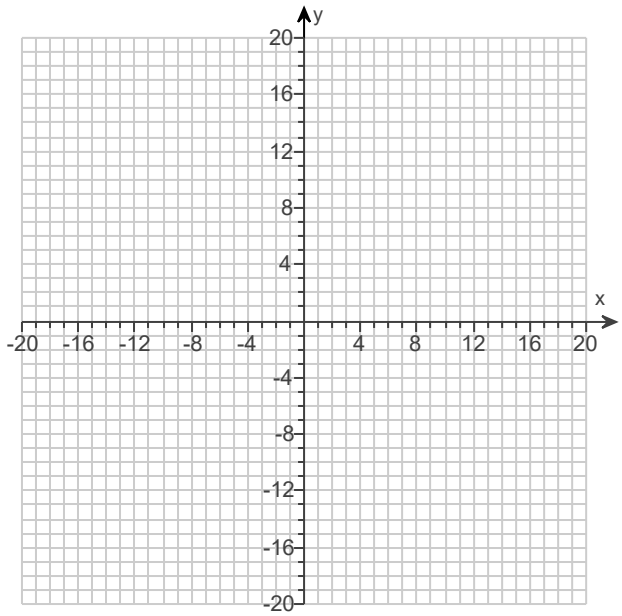
Use the graphing tool to graph the inequality.



50. Graph the inequality on a plane.

$5y - 6x > 30$

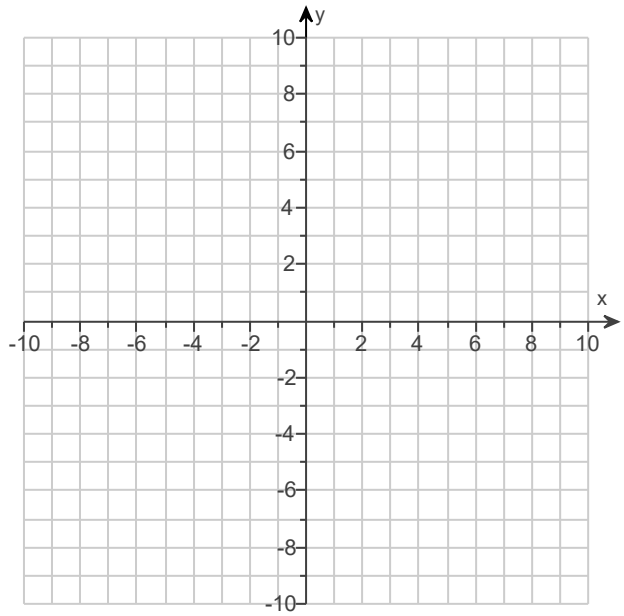
Use the graphing tool on the right to graph the inequality.



51. Graph the inequality.

$x \leq 6$

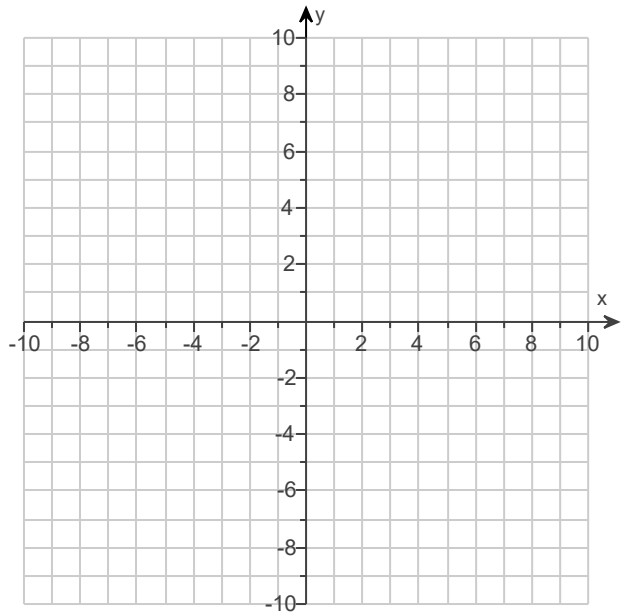
Use the graphing tool on the right to graph the inequality.



52. Graph the following inequality.

$y > (x - 2)^2 + 1$

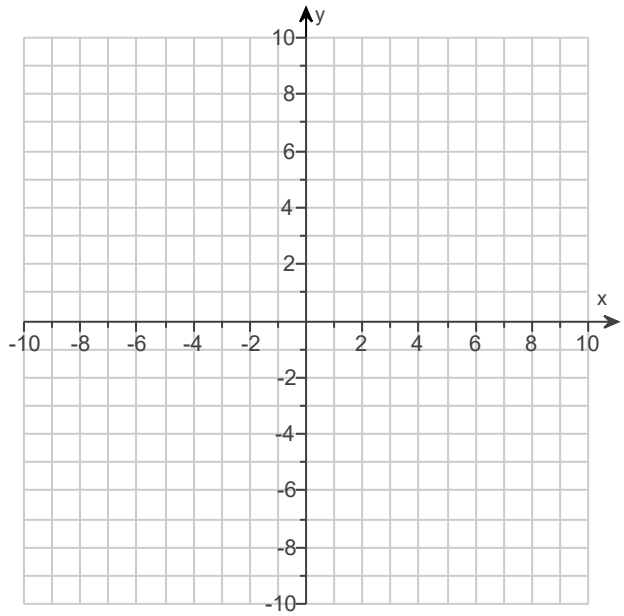
Use the graphing tool on the right to graph the inequality.



53. Graph the inequality.

$x^2 + (y + 3)^2 \leq 25$

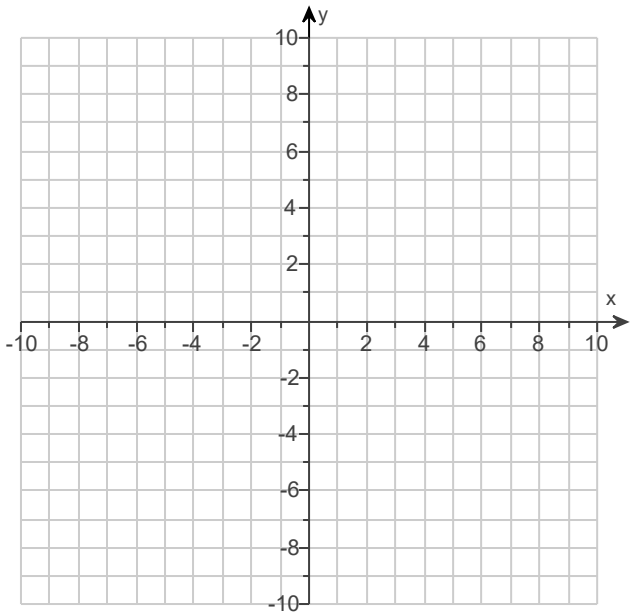
Use the graphing tool on the right to graph the inequality.



54. Graph the following inequality.

$y > 2^x + 3$

Use the graphing tool to graph the inequality. Graph the region that represents the correct solution only once.



55. Which one of the following is a description of the graph of the inequality $(x - 5)^2 + (y - 1)^2 < 25$?

A. the region inside a circle with center (5,1) and radius 5
B. the region outside a circle with center (− 1,5) and radius 5
C. the region inside a circle with center (− 1, − 5) and radius 25
D. the region inside a circle with center (5,1) and radius 25

The answer is (1) _____

(1) ○ A.
○ B.
○ C.
○ D.

56. Match the inequality with the appropriate calculator graph. Do not use your calculator; instead, use your knowledge of the concepts involved in graphing inequalities.

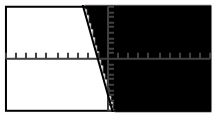
$y \le 7x - 7$

Chose the correct graph.

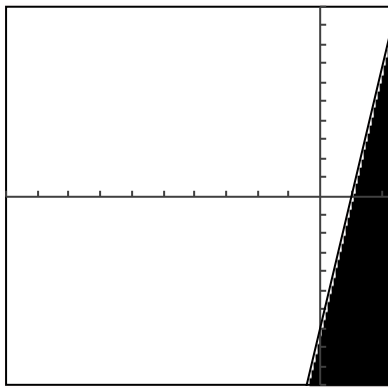
- D
- A
- C
- B

The window is $[-10,10] \times [-10,10]$.

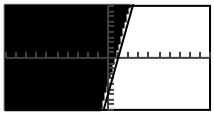
A



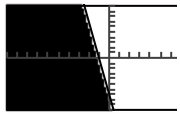
B



C



D



57. Match the inequality with the appropriate calculator graph. Do not use your calculator; instead, use your knowledge of the concepts involved in graphing inequalities.

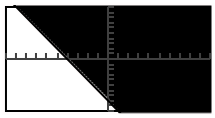
$y \le -2x - 8$

Chose the correct graph.

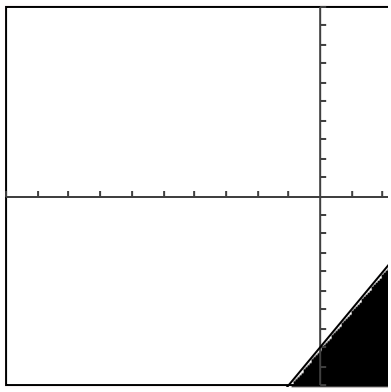
- D
- A
- C
- B

The window is $[-10,10] \times [-10,10]$.

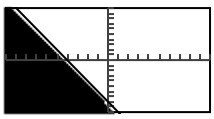
A



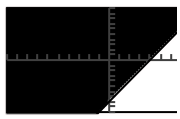
B



C



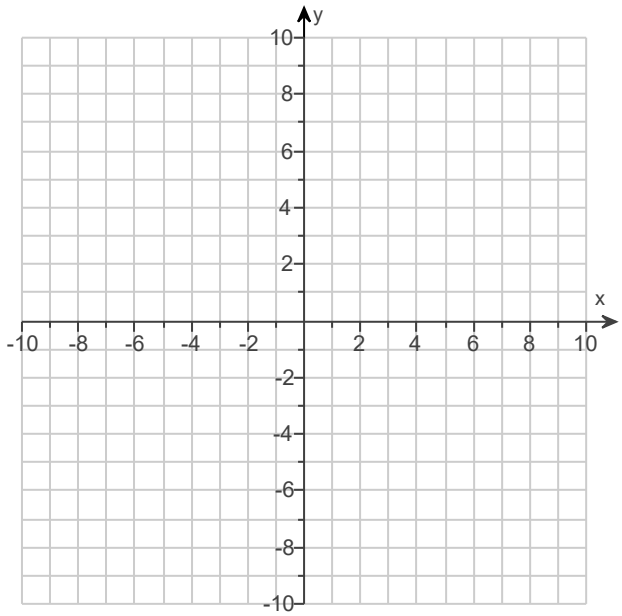
D



58. Graph the solution set of the following system of inequalities.

$$x + 2y \le 4$$
$$y \ge x^2 - 2$$

Use the graphing tool to graph the system. Graph the region that represents the correct solution only once.



59. Determine the system of inequalities illustrated in the graph. Write inequalities in standard form.

Choose the appropriate system.

A.
$$\begin{cases} x - y \le 5 \\ y \le -2 \end{cases}$$

B.
$$\begin{cases} x^2 + y^2 \le 5^2 \\ y \ge -2 \end{cases}$$

C.
$$\begin{cases} x^2 + y^2 \ge 5^2 \\ y \ge -2 \end{cases}$$

D.
$$\begin{cases} x + y \ge 5 \\ y < -2 \end{cases}$$