Module 2: Systems of Equations and Inequalities

Section 2.1 Graphs and Solutions

Practice Problems 2.1

For Problem 1-4, graph the inequality given on the number line given.

1. $p > -2.5$

2. $h < 4\frac{2}{3}$

3. $-5 \leq x$

4. $3 \geq z$

For Problem 5-10, match the inequality given with the graph that represents it.

5. $l \geq 3$

6. $-4 < w$

7. $m \geq 4$

8. $0 \leq s$

9. $p > 4$

10. $n \leq -4$

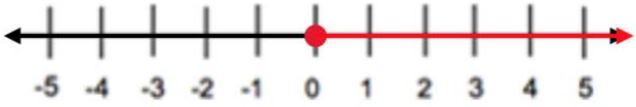
a)

b)

c)

d)

e)



f)

g)

For Problem 11-13, solve the word problem given.

11. What are two ways to write b) from Problem 5-10 above using inequality symbols? You found one already so write it another way.

12. Write an inequality to represent a sign for a job that says: "Wages are $15 an hour or more." Let w represent wages.

13. Write an inequality to represent a parking garage sign that says: "Maximum $12.00 per day." Let p represent parking fees.

For Problem 14-16, write an inequality for the situation given.

14. m is a non-negative number

15. V is no less than -2

16. W is no greater than 1.5

For Problem 17- 20, solve the word problem given.

17. Show $n \neq 4$ on the number line. It is equal to any number except that.

18. What is the greatest integer that satisfies the inequality $u < -6$?

19. What is the smallest integer x can be if $-4 \leq x < 1$?

20. What integer satisfies the inequality $m > -1$ and $m < 1$?

Section 2.2 Solving Multi-Step Inequalities

Practice Problems 2.2

For Problem 1-6, solve the inequality given. Check at least one of the solutions.

1. $m + 8 < 16.2$

2. $-25 \leq 5z$

3. $-7 \leq -3 - 4a$

4. $8 \leq -12 + 4q$

5. $2(3p + 7) > 7 - 2p$

6. $4(l + 2) - 3l \geq 1$

For Problem 7-10, solve the word problem given.

7. Riddhi solved $-10t \leq 135$ by adding 10 to both sides of the equation. She got $t \leq 145$ as a solution. When Riddhi substituted 145 in for t, she got a solution that worked. What is the correct solution for t? Why did her solution work?

8. The student council members sold mums to earn money for a trip to Washington D.C. They make $\$1.55$ profit per mum sold. How many mums would the student council have to sell to earn at least $\$450.00$ for the trip?

9. There are 25 members in the student council from Problem 8. At least how many mums must each member sell for the group to earn at least $\$450.00$ in profits?

10. There are 120 members of a senior class. They sell school cups and make $1.25 profit on each cup. How many must each senior sell to earn at least $1,145.00 for their senior trip?

For Problem 11-20, solve the inequality given and graph the solution on the number line.

11. $x + 4 \geq 3$

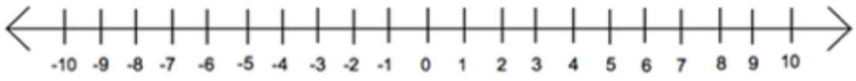
12. $x + 5 \leq 10$

13. $x + 3 \leq 0$

14. $2x - 4 \leq 14$

15. $2x + 7 \leq 10$

16. $4t + 9 < 21$



17. $3(t + 1) \geq -5$

18. $2a - 10 + 5a > 6 - a$

19. $-7a + 10 - 2a \geq 100$

20. $-2(a - 6) + 4a \geq 22$

Section 2.3 Solving Compound Inequalities

Looking Back 2.3

For Problem 1-3, write an inequality for the situation given. First define the variables. The word "between" means including.

1. Bananas sell for between \$0.32 per pound and \$0.44 per pound.

2. Depending on the quality, the price of silver is between \$12.20 per ounce and \$16.60 per ounce.

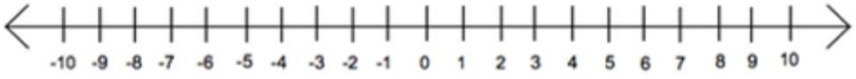
3. Discounted rates at an amusement park are given for groups between 8 and 12 people or groups of more than 12 people.

For Problem 4-10, solve the compound inequality given and graph your solution on the number line.

4. $-10 < p - 5 \leq 2$

5. $-16 \leq 2m + 4 < 28$

6. $5d + 8 \leq 2d + 41$



7. $5(2p - 1) < 11p$

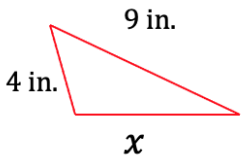
8. $2 - 17n > 2n - 36$ or $-3n + 5 < -10$

9. $\frac{3+p}{4} > 2$ or $\frac{3+2p}{5} < -1$

10. $-6 < 2(x + 3) < 8$

For Problem 11 and 12, solve the word problem given.

11. In any triangle (right, acute, or obtuse), the length of two sides is greater than the other side. You will learn why in Geometry and Trigonometry, so stay with us! Using this information, what are the possible values for x? Write your solution as an inequality.



12. A given spring is stretched d inches by applying a force of F pounds. The force exerted on a spring is directly proportional to the distance it is stretched from the resting position. Suppose your stretching distance is d inches by applying a force of F pounds; for this spring is $\frac{d}{f} = 0.6$. An exerted force is between 30 and 45 pounds including 30 and 45 pounds. Write an inequality describing the stretch and find the possible distances stretched.

For Problem 13-16, write the compound inequalities as two inequalities in terms of the variables.

13. $-2 < x < 2$

14. $-5 < y < 5$

15. $16 \leq x + 4 \leq 22$

16. $x + 2 > 5$ or $\frac{x}{3} < 1$

For Problem 17-19, solve the inequality given and graph it on the number line.

17. $-5 < 3y + 1 < 10$

18. $1 < 2x - 11 \leq 9$

19. $\frac{2+x}{5} > 2$ or $\frac{3-x}{4} > -1$

20. Write an inequality about yourself. For example, "I am over 5 feet tall," which would be: $h > 5$.

Section 2.4 Absolute Value Equations

Practice Problems 2.4

For Problem 1-9, solve the equation given and check your solution.

1. Is there a solution for $|t| = -15$? Where is that explained in the rules for solving absolute value equations and why?

2. $|b| = 1.7$

3. $|b| + 2.1 = 8.3$

4. $15 = |m| + 16$

5. $28 = 2|m|$

6. $13 = |r + 5|$

7. $|n - 7| = 27$

8. $4|p + 3| = 16$

9. $\left|\frac{1}{3}p\right| + 1 = 7$

For Problem 10-20, solve the problem given.

10. An absolute value has two solutions: they are 1 and -7. What is the absolute value equation? How did you solve it?

11. Kiera and Collin both live 4.7 miles from the bank, but one lives east of it and one lives west of it. Write this situation as an absolute value function.

12. Dugan and Daytona ride their bikes to the nearest park to skateboard. They both live 1.2 miles from the skatepark, but Dugan lives north of the park and Daytona lives south of it. Write this situation as an absolute value function.

13. Solve the equation: $|x + 5| = 2$

14. Solve the equation: $2|3x + 1| = 4$

15. How many solutions are there for y below? Why?

$$|2y - 4.2| - 3 = -3$$

16. How many solutions are there for x below? Why?

$$5|x + 4| - 3 = -2$$

17. How many solutions are there for x? Why?

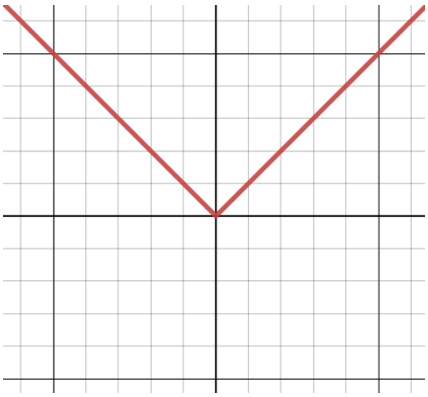
$$-2|x - 1| = 4$$

18. What values will work for y in the equation below?

$$|y| = y$$

19. What is the domain and range for m given $-|m| = m$? (Domain is all the possible input values and range is all the possible output values.)

20. The absolute value function $y = |x|$ has the shape shown below.



When x is positive, y is _____

When x is negative, y is _____

Section 2.5 Absolute Value Inequalities

Practice Problems 2.5

For Problem 1-8, solve the inequality and graph the solution.

1. $|n + 6.5| \geq 2.5$

2. $|2y - 3.5| \geq 6.5$

3. $|a| \leq 7$

4. $\left|m + 2\frac{1}{2}\right| < 7\frac{1}{2}$

5. $|3p + 1| < 8$

6. $|n - 3| \leq 4$

7. $|4p + 1| > 11$

8. $|6 - s| < 3$

For Problem 9-12, write an absolute value inequality to represent the situation given.

9. All numbers greater than 5 units from 0 or 5 units from 0.

10. All numbers whose distance from -1 is less than 7 units.

11. A quality manufacturer checks CD-Rs for quality assurance. The ideal disc is 11.7 centimeters in diameter with a margin of error of 0.013 cm. Write an inequality to represent the possible diameters for CD-Rs that pass the quality control test (this is called tolerance).

12. There are thirty DVDs packaged in a cylindrical container for sale. Each DVD weighs about 0.06 ounces. To check that there are thirty DVDs in a package, quality control assurance allows for an error of 0.07 ounces.

a) What is the acceptable range (margin) of error if the container weight is 0.5 ounces?

b) For any given package, can the manufacturer be absolutely sure there are thirty DVDs in the package? Defend your solution.

For Problem 13-20, follow the instructions given to solve the problem.

13. Fill in the blanks with: ≥ (greater than or equal to); ≤ (less than or equal to); = (equal to).

a) $\left|\frac{a}{b}\right|$ _____ $\left|\frac{a}{b}\right|$ given $b \neq 0$

b) $|a-b|$_____$|a|-|b|$

c) $|a+b|$_____$|a|+|b|$

d) $|a \cdot b|$_____$|a| \cdot |b|$

14. Circle all the solutions of the inequality $-6 < 18x + 24$.

a) -1

b) -3

c) 0

d) 5.8

15. Circle all the solutions of the inequality $2(5+x) - 2 > 10$.

a) 0

b) -2

c) 2

d) 0.5

16. Circle all the solutions of the inequality $3(5-x) + 4 \geq 13$.

a) -1

b) -3

c) 0

d) 5.8

17. Circle all the solutions of the inequality $0.5 \leq -1.5x + 2(x-3)$.

a) -1

b) -3

c) 0

d) 15

18. If x is the input and $f(x)$ is the output, which ordered pair $(x, f(x))$ is a solution of $f(x) = |x| + 2$?

a) $(2, 4)$

b) $(7, 5)$

c) $(0, 1)$

d) $(-2, 0)$

19. If x is the input and $g(x)$ is the output, which ordered pair $(x, g(x))$ is a solution of $g(x) = |x-8|$?

a) $(-1, 9)$

b) $(0, -8)$

c) $(4, 5)$

d) $(8, 8)$

20. If x is the input and $h(x)$ is the output, which ordered pair $(x, h(x))$ is a solution of $h(x) = \left|\frac{7}{x}\right|$? Check all of the solutions given.

a) $(0, 0)$

b) $(-1, -7)$

c) $(14, 21)$

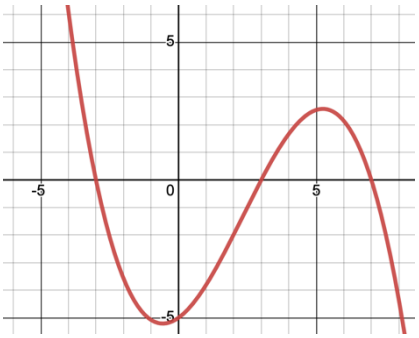
d) $(7, 1)$

Section 2.6 Systems of Equations

Practice Problems 2.6

For Problem 1-10, solve the problem given.

1. Which of the following is not an x-intercept of the graph to the right?



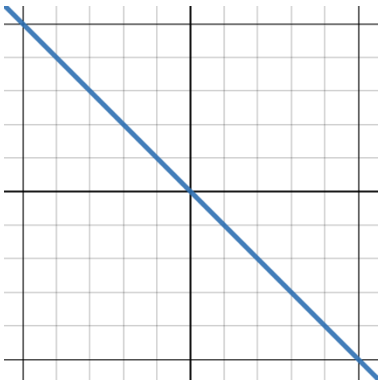
a) -3
b) -5
c) 3
d) 7

2. Which of the following is the y-intercept of the graph in Problem 1?

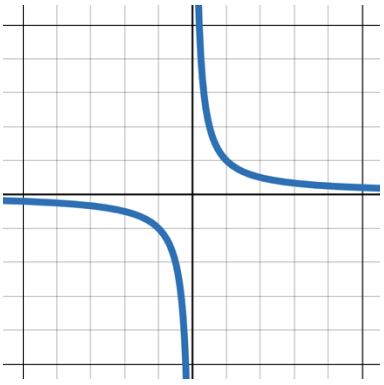
a) -3
b) -5
c) 3
d) 7

3. Which of the following graphs represents a linear graph?

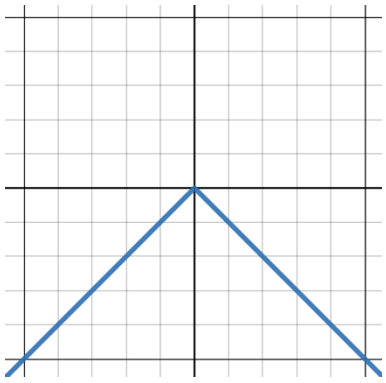
a)



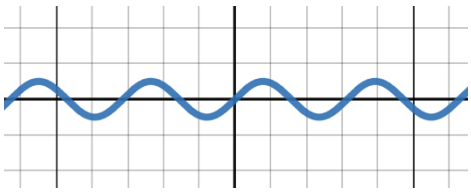
b)



c)



d)



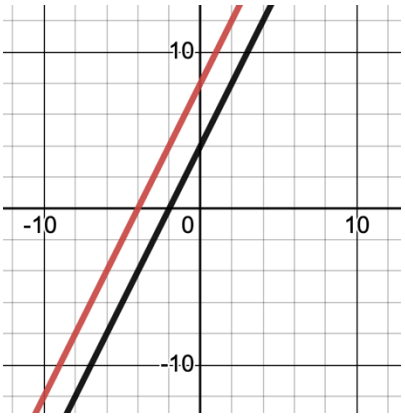
4. Which graphs in Problem 3 are non-linear?

5. Which graphs in Problem 3 cross through the origin?

6. Tosha makes $10.50 per hour for a 40-hour work week at the YMCA. For every hour over 40 hours she works, she is paid for one-and-a-half hours of work. How much does Tosha get paid if she works 42 hours in one week?

a) $451.50
b) $435.25
c) $441.00
d) $430.50

7. If the graph below represents Plant Dynamo's and Plant Exacto's growth, when will they be the same height?



8. Scottie is playing *Slider* on the computer. The computer gets the first turn of the game and randomly places an "x" in one of the grid squares labeled with letters on the gameboard. The frequency table below shows the computers first move for twenty games.

Letter on Grid	A	B	C	D	E	F	G	H	I
Number of First Moves	2	1	0	4	1	1	7	3	1

What is the experimental probability the next first move by the computer will be an F?

a) $\frac{0}{20}$ b) $\frac{3}{20}$ c) $\frac{1}{10}$ d) $\frac{1}{20}$

9. Mau'anna calculates that the days to finish a job vary inversely with the number of workers. As the number of workers decreases, the days to finish a job increase according to the following equation…

$$D = \frac{k}{w}$$

… in which D is the number of days, k is a constant of proportionality, and w is the number of workers

If twelve workers can finish a job in five days, how many days would it take ten workers to finish the same job?

a) Six b) Eight c) Ten d) Twelve

10. Which sequence of numbers below is the same as the following sequence?

$$\frac{1}{2}, 1.0, 1\frac{1}{2}, 200\%$$

a) $0.05, 10\%, 1.5, 2.00$

b) $0.5, 100\%, \frac{3}{2}, 2$

c) $50\%, 0.1, 0.15, 2$

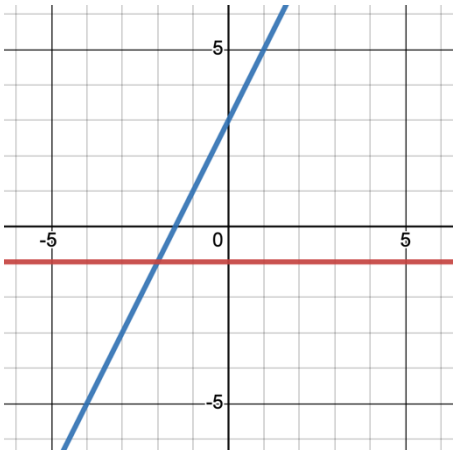
d) $50\%, 100\%, \frac{3}{2}, 4$

Section 2.7 Solving Systems of Equations Using a Graph

Practice Problems 2.7

For Problem 1-6, use the graph given to solve the problem.

1.



a) Kathy said that $(-2, -1)$ was a solution to the graph below. Bev said she agreed with the -1, but was not sure about the -2. Keli said the y-value is definitely -1; how did she know?

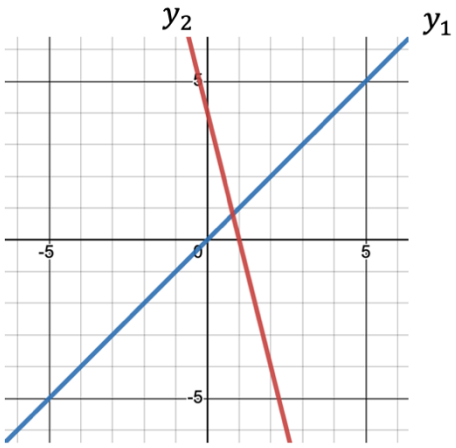
b) Shakila said if she found an equation for the original line, it would be easy to find the x-coordinate. Why is this true?

c) Carol said if they found the other equation, they could make the equations equal to each other and find out what x is. Does this method work?

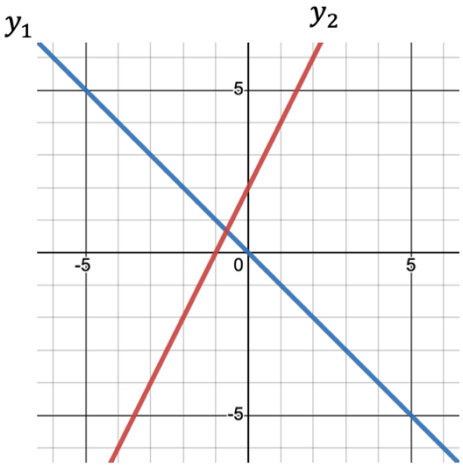
d) Leslie said she found the solution by looking at the graph. What is the solution she found?

e) Susan said she could prove that Leslie's solution was correct. How did she check it?

2. If $y_1 = x$, then find the equation for y_2 and the point of intersection of the two graphs. Check your solution.



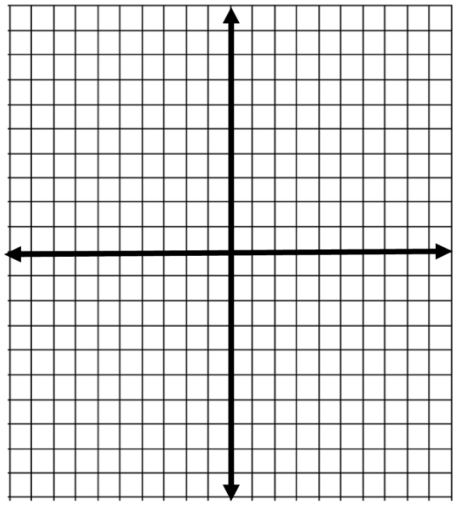
3. What is the equation for y_1 below? What is the equation for y_2? Find the solution for the system of linear equations and check your solution.



4. Draw the graphs of the system:

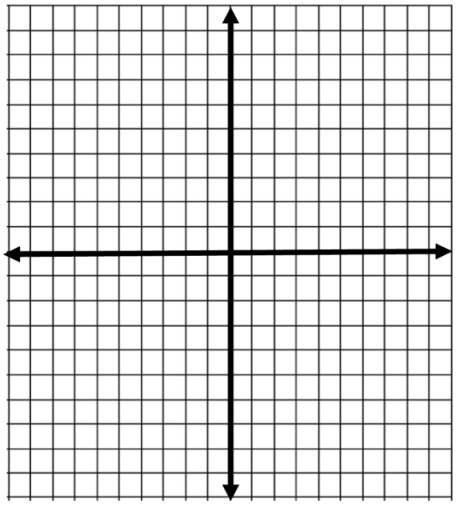
$$y_1 = x + 1$$
$$y_2 = 3x - 3$$

What is the point of intersection? Check your solution.



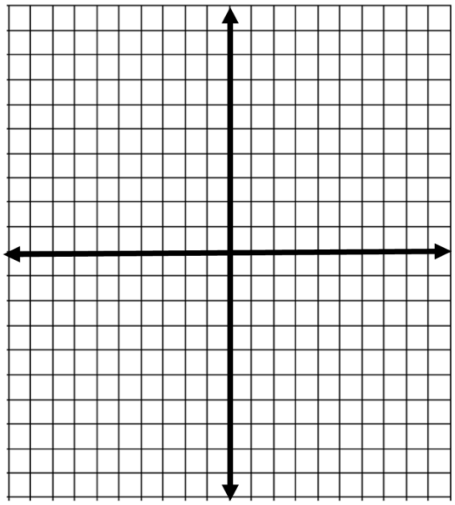
5. Convert the standard form linear equations to slope-intercept form, graph the equations, and find the point of intersection. Check your solution.

$$x + y = 10$$
$$-4x + 2y = 2$$



6. Draw the graphs of the equations below and find the solution of the system.

$$y_1 = 2x + 2$$
$$y_2 = 2x - 1$$



For Problem 7-12, convert the standard form equation given to the slope-intercept form. Solve for x in terms of y.

7. $2x + 3y = -10$

8. $x - 2y = 7$

9. $4x + y = 19$

10. $2x + 2y = 2$

11. $x - y = 7.8$

12. $x + 6y = 6$

For Problem 13-20, solve the problem given.

13. Set y_1 equal to y_2 ($y_1 = y_2$) and solve for x.

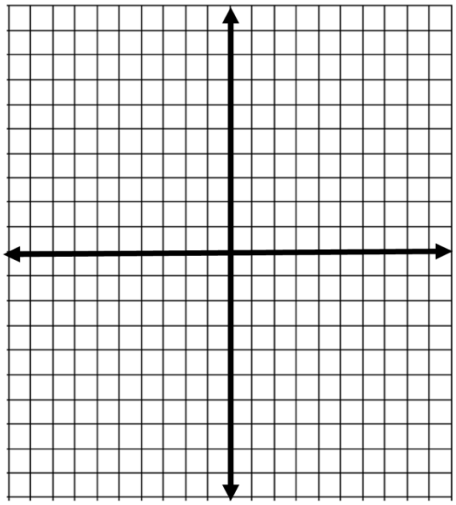
$$y_1 = 2x + 2$$
$$y_2 = \frac{1}{2}x + 3$$

14. Put the value of x from Problem 13 in each equation and solve for y.

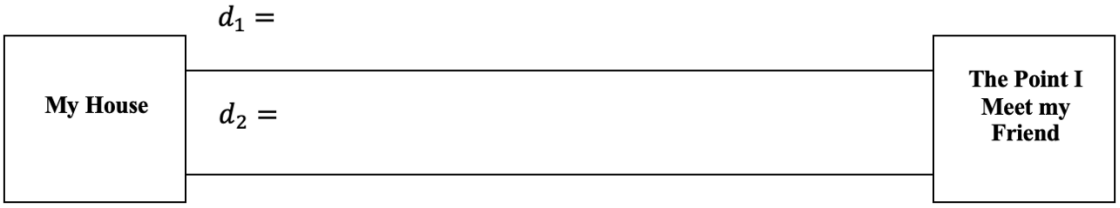
15. Why would it be difficult to find the solution of Problem 13 by graphing the lines and finding the point of intersection?

16. Graph the system of equations and find the point of intersection. Is $(3, 9)$ a solution of the system below. Use the slope and y-intercept to graph the equation and verify it on the graph.

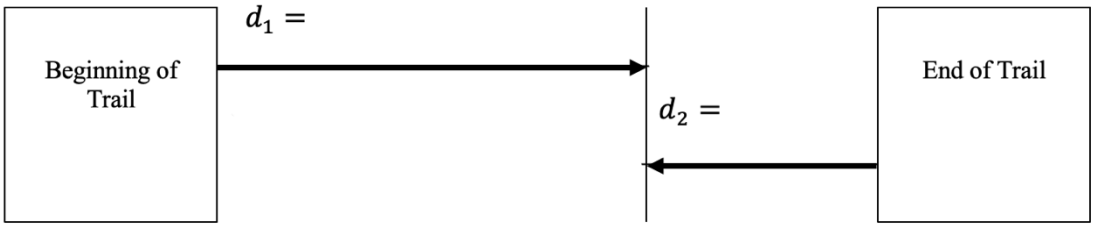
$$y_1 = 4x - 3$$
$$y_2 = \frac{1}{3}x + 8$$



17. My friend runs by my house at a pace of 6 miles per hour. By the time I get on my running shoes, she is 0.5 miles ahead of me. I run at a rate of 7 miles per hour. Write a system of equations to solve the problem and find the point I will catch up to her. Let $t =$ time and $d =$ distance.



18. I am walking a trail from the beginning to the end, and I am walking at a rate of 2.2 miles per hour. My friend walked to the end, turned around and is walking back. She is tired and walking slower, at a rate of 1.1 miles per hour. The trail she is on is 4 miles long. When will we meet? Set up a system of equations using $t =$ time, $d =$ distance, and the formula $r \cdot t = d$.



19. Is $(4, -3)$ a solution to the system below:

$$\begin{cases} y = 2x - 11 \\ y = x - 5 \end{cases}$$

20. Is $(-4, -1)$ a solution to the system below:

$$\begin{cases} y = x + 3 \\ y = 3x + 11 \end{cases}$$

Section 2.8 One Solution, No Solution, or Infinite Solutions

Practice Problems 2.8

For Problem 1-4, look at the system of equations and tell whether it has one solution, infinite solutions, or no solutions. Convert the equation in standard form to slope-intercept form.

1. $\begin{cases} y = -0.6 + 3.2 \\ y = -\frac{3}{5}x - \frac{1}{2} \end{cases}$

2. $\begin{cases} y = 5x + 6 \\ y = -\frac{1}{5}x + 0.4 \end{cases}$

3. $\begin{cases} 3x + 2y = -6 \\ 6x + 4y = -12 \end{cases}$

4. $\begin{cases} 2y = -4x - 6 \\ y = -2x + 5 \end{cases}$

For Problem 5-7, tell whether the lines are parallel, perpendicular, or neither. Convert equations to slope-intercept form if they are not already in that form.

5. $\begin{cases} y = -\frac{1}{4}x + 8 \\ y = 4x - 2.1 \end{cases}$

6. $\begin{cases} \frac{3}{4}x + y = 10 \\ -\frac{4}{3}x - y = -3 \end{cases}$

7. $\begin{cases} -4x + 2y = 6 \\ -6x + 3y = -27 \end{cases}$

For Problem 8-15, solve the word problem given.

8. Karen has $190.00 and saves $3.00 per week. Lynnette has $100.00 and saves $8.00 per week. How many weeks will it be before Karen and Lynnette have the same amount of money?

9. Asher and Sophie have 49 children's books in their library. They buy 3 new books each month. Gabriel and August are starting a home library with 22 books and they each buy 6 new books a month. How many months will it be until Gabriel and August have as many children's books as Asher and Sophie?

10. During school hours, Natalie, Allyson, and Brittany were continually loaning and borrowing supplies. These friends worked out a system of sharing. The first loaned the second and third as many pencils as they already had. Then, three months later, the second friend loaned the first and third as many pencils as they already had. Finally, three months later, the third did the same for the first and second friend. Each friend now has 24 pencils. How many pencils did each friend start out with?

11. What values of a and b will give no solution to the system:

$$\begin{cases} y = ax + b \\ y = 3x - 2 \end{cases}$$

12. What values of a and b will give infinite solutions to the system:

$$\begin{cases} y = ax + b \\ y = 3x - 2 \end{cases}$$

13. Let $\begin{cases} y = ax + b \\ y = 3x - 2 \end{cases}$. If a and b are real numbers, how many solutions will the system have given…

$$a \neq 3 \text{ and } b \neq -2$$

a) No solutions b) Two solutions

c) One solution d) Infinite solutions

14. What value of a will give one solution to the system:

$$\begin{cases} y = ax - 3 \\ y = 4x - 3 \end{cases}$$

15. What value of a will give a perpendicular line to the other line for the system:

$$\begin{cases} y = ax - 2 \\ y = 6x + 1 \end{cases}$$

Section 2.9 Solving Systems of Equations Using the Substitution Method

Practice Problems 2.9

For Problem 1-3, solve the system of equations given using the substitution method and check your solution.

1. $\begin{cases} y = x + 5 \\ -3x + y = 5 \end{cases}$

2. $\begin{cases} -\frac{1}{2}x + y = 10 \\ y = 4x + 10 \end{cases}$

3. $\begin{cases} 2x + y = 24 \\ -4x + y = 12 \end{cases}$

For Problem 4-7, follow the instructions given to solve the problem.

4. George and Elizabeth want to rent a cabin for their vacation. They can pay $100.00 down and $50.00 per day for one cabin or $50.00 down and $75.00 per day for a second cabin. After how many days will the amount be the same? What does this mean in terms of saving money on vacation?

5. Solve the system of equations using the substitution method.

$$\begin{cases} x - 2y = 12 \\ x - 3y = -24 \end{cases}$$

6. Use the system of equations to answer the questions a) and b).

$$\begin{cases} y = mx + 2 \\ y = nx - 6 \end{cases}$$

a) If $m < n$, will there be one solution, no solution, or infinite solutions?

b) If $m \geq n$, will there be infinite solutions sometimes, always, or never?

7. Regan works at a restaurant waiting on tables and makes $\$150.00$ a week plus $\$0.20$ in tips for every person he serves. Angela delivers newspapers and makes $\$75.00$ a week plus a $\$0.25$ commission for every person she delivers to. How many people must be served by Regan or receive a paper from Angela before they make the same amount of money? Which job would you prefer given these rates?

For Problem 8-13, use the equations in Problem 8 and 9 to solve the problem.

8. Solve for y in terms of x for $2x - y = -2$.

9. Solve for y in terms of x for $x - 2y = -6$.

10. To find the y-value in which the equations from Problem 8 and 9 intersect, set them equal to one another and solve for x.

11. Now substitute x in both equations and solve for y.

12. What is the ordered pair in which the lines intersect? Check the solution in both equations.

13. Where the lines cross is the point of intersection. If the lines are parallel, what point do they have in common?

For Problem 14-20, follow the instructions given to solve the problem.

14. Find the point of intersection for the system of equations.

$$\begin{cases} y = 4x - 3 \\ y = \frac{1}{3}x + 8 \end{cases}$$

15. Why do you only need to substitute x in one equation to solve for y in Problem 14? Solve for y using the other equation that you did not use in Problem 14.

16. Use substitution to solve for the system of equations below. Because the second equation has x in terms of y, substitute $3y$ in the first equation for x and solve for y.

$$\begin{cases} 2x + 3y = 3 \\ x = 3y \end{cases}$$

17. Now that you know the value of y in Problem 16, substitute that in one of the equations and find the value of x. Which equation is easier to use?

18. Substitute the ordered pair that is a solution to both equations and check your solution for the equations below.

$$2x + 3y = 3 \text{ and } x = 3y$$

19. Does the system of equations have one solution, no solution, or infinite solutions?

$$\begin{cases} x + y = 0 \\ x + y = -8 \end{cases}$$

20. Does the system of equations have one solution, no solution, or infinite solutions?

$$\begin{cases} y = \frac{1}{2}x - \frac{7}{2} \\ -3x + 6y = -21 \end{cases}$$

Section 2.10 Solving Systems of Equations Using the Elimination Method

Practice Problems 2.10

For Problem 1-16, solve the system of equations given by elimination.

1. $\begin{cases} 2x + 3y = 17 \\ 10x + 4y = 30 \end{cases}$

2. $\begin{cases} -a + b = 13 \\ a + 7b = 11 \end{cases}$

3. $\begin{cases} 4m - 6n = 0 \\ 10m - 6n = 18 \end{cases}$

4. $\begin{cases} 3p - 10q = -25 \\ 4p + 40q = 20 \end{cases}$

5. $\begin{cases} -4s + t = 2 \\ -12s + 2t = -20 \end{cases}$

6. $\begin{cases} u + v = 4 \\ 2u + v = 13 \end{cases}$

7. $\begin{cases} 18x + 2y = -9 \\ 18x + 4y = -27 \end{cases}$

8. $\begin{cases} -7x + 2y = -10 \\ 7x + y = 16 \end{cases}$

9. $\begin{cases} 2x - 3y = -24 \\ 2x + 6y = 30 \end{cases}$

10. $\begin{cases} 20x + 3y = 10 \\ -20x + 5y = 70 \end{cases}$

11. $\begin{cases} 2x - 3y = 3 \\ 4x - 2y = 10 \end{cases}$

12. $\begin{cases} -2x + 4y = 26 \\ 3x + y = -11 \end{cases}$

13. $\begin{cases} 2x - 5y = 10 \\ 2x - 5y = 11 \end{cases}$

14. $\begin{cases} 2x + 3y = 6 \\ -4x - 6y = -12 \end{cases}$

15. $\begin{cases} ax + by = c \\ x + by = c \end{cases}$

16. $\begin{cases} x + y + z = 34 \\ x - y - z = 10 \\ x + z = 30 \end{cases}$

For Problem 17-20, solve the word problem given.

17. Gary and Jeanette were doing a fundraiser for the local children's hospital. They sold sheets of wrapping paper for $0.50 each and ribbons for $0.25 each. At the end of the first week, they had sold 77 items for a total of $32.50. How many wrapping paper sheets and ribbons did Gary and Jeanette sell the first week?

18. Suppose you have 353 coins in a jar. The coins are nickels and dimes. When you take the jar to the bank to count it, it totals $26.15. How many nickels and how many dimes are in your jar?

19. There are 240 children in a musical. There are two times the number of boys to girls. How many boys are in the musical and how many girls are in the musical?

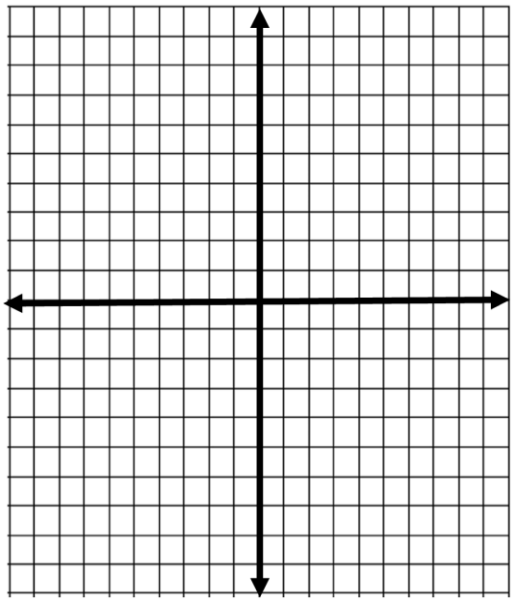
20. There are 540 homes in a neighborhood. Developers want to build three times as many two-family homes as single-family homes. How many single-family homes will the developer build?

Section 2.11 Graphing Linear Inequalities

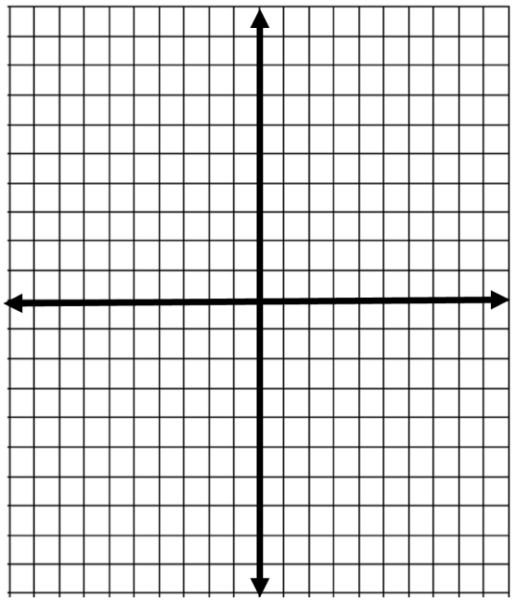
Practice Problems 2.11

For Problem 1-3, solve and graph the inequality given.

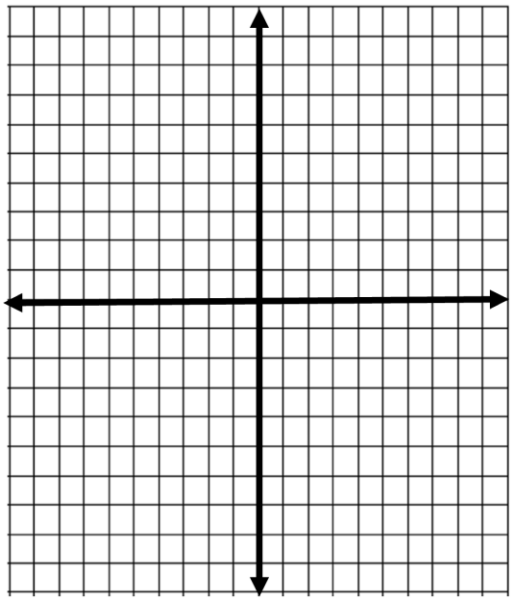
1. $6y > -3$



2. $4x < 4$

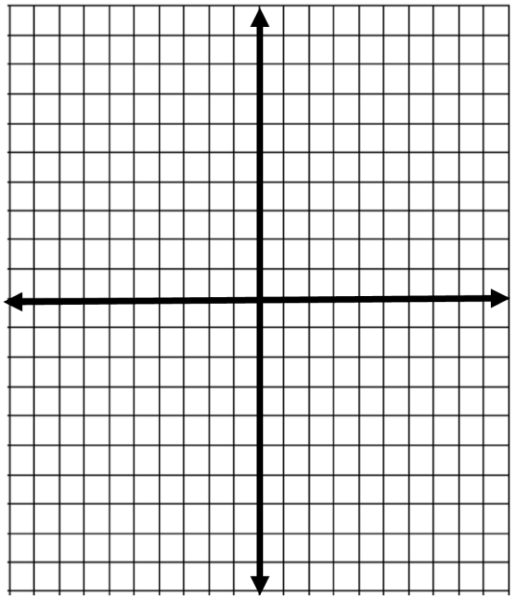


3. $4 - y \leq 9$



For Problem 4-6, follow the instructions given to solve the problem.

4. Graph the inequality $-2x + y \geq 2$. Which points below satisfy the inequality?



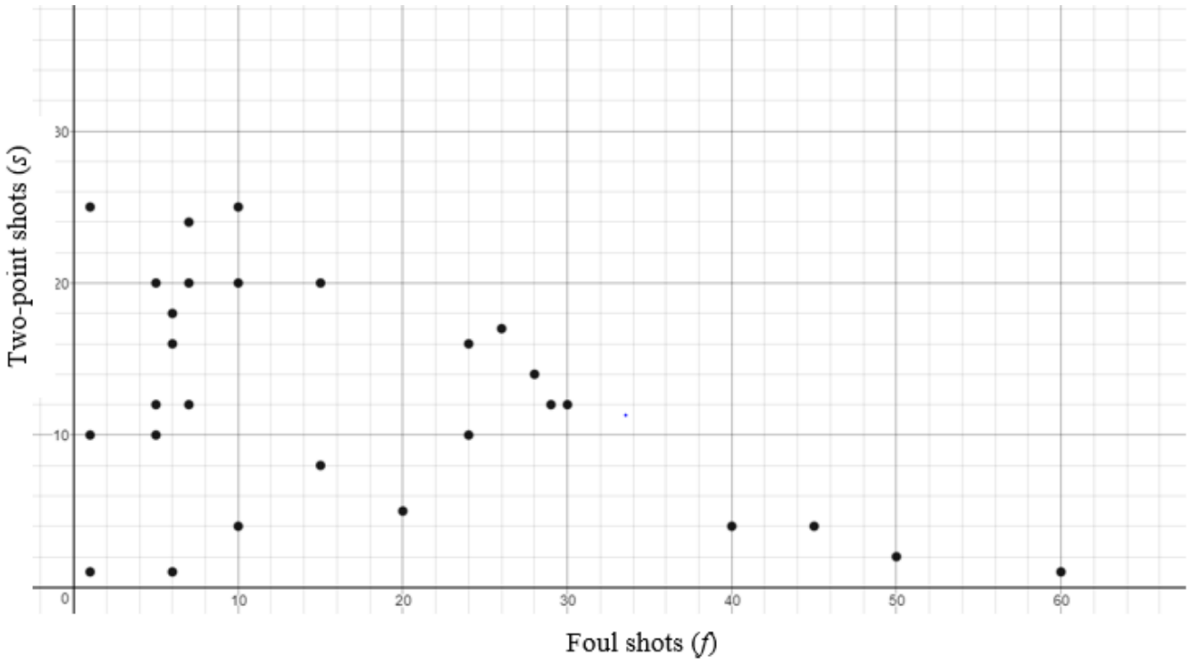
a) $(-2, 3)$

b) $(4, 1)$

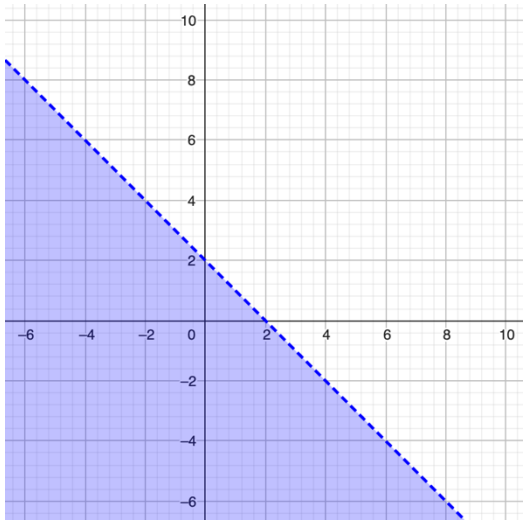
c) $(-4, -4)$

d) $(2, -1)$

5. In basketball, a free-throw is worth one point and a shot inside the 3-point line is worth two points. In a game, free-throws and 2-point shots combined for less than 64 points in a game. Write the inequality to represent this combination. Some of the possible point combinations are on the graph below. What is the equation to represent the boundary line given 64 points were scored in the game? Using the graph below, name at least three possible combinations that are on the boundary line and would result in 64 points.



6. Circle the inequality that is graphed below.



a) $y \leq -x + 2$

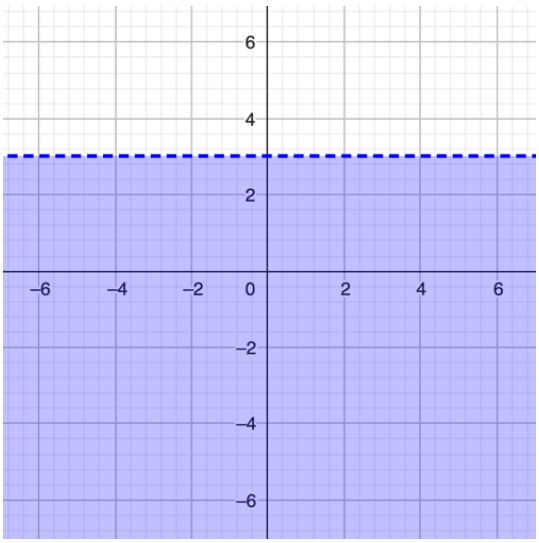
b) $y > x - 2$

c) $y < 2 - x$

d) $y < 2 - x$

For Problem 7-10, name the inequality that represents the graph given.

7.



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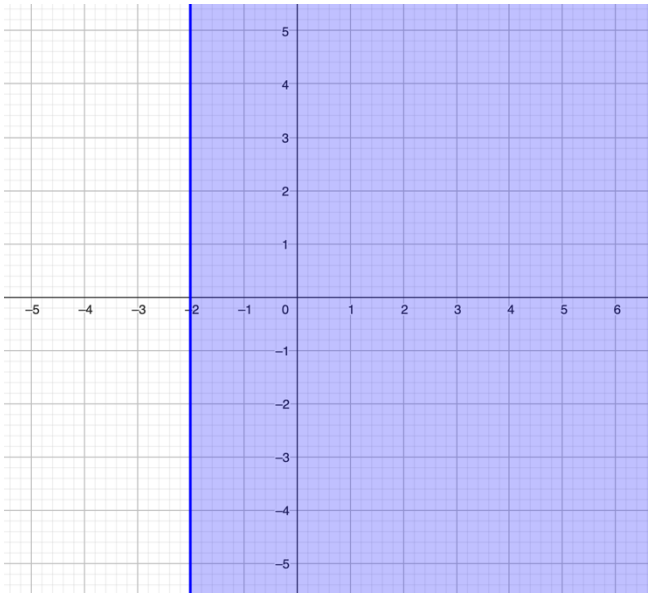

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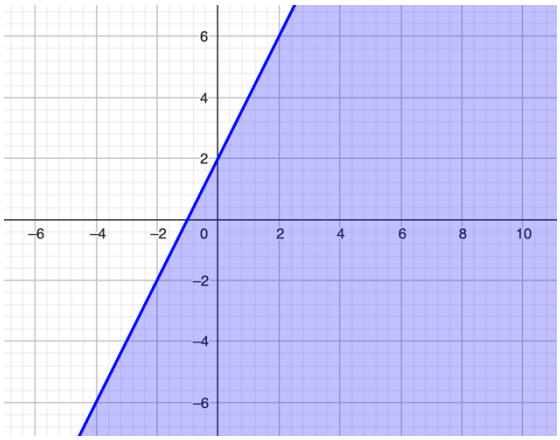

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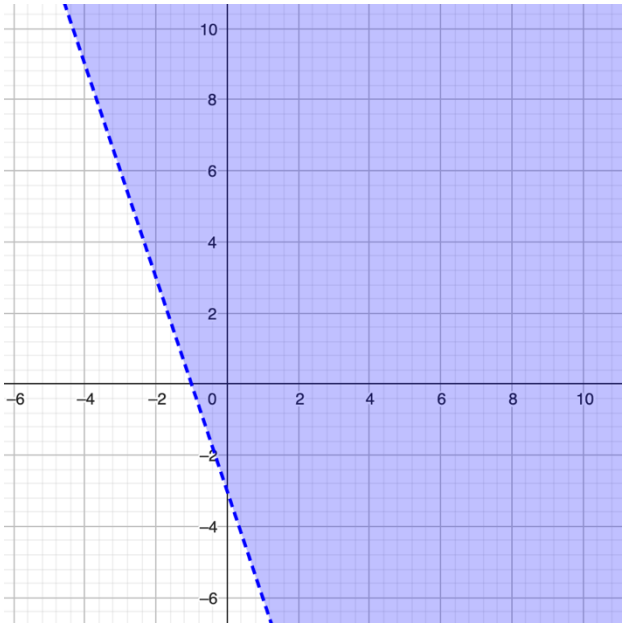
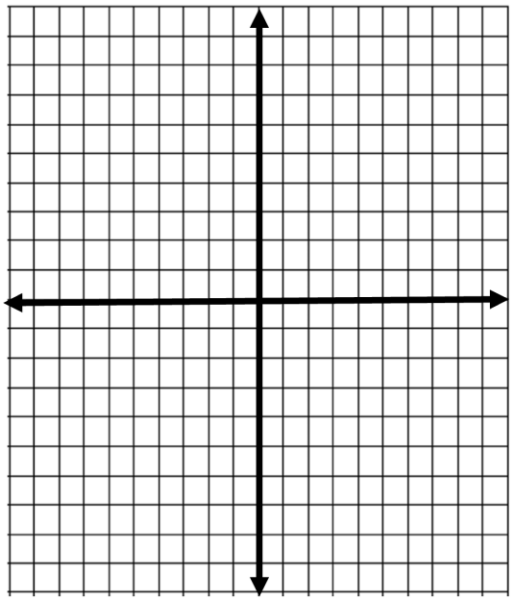
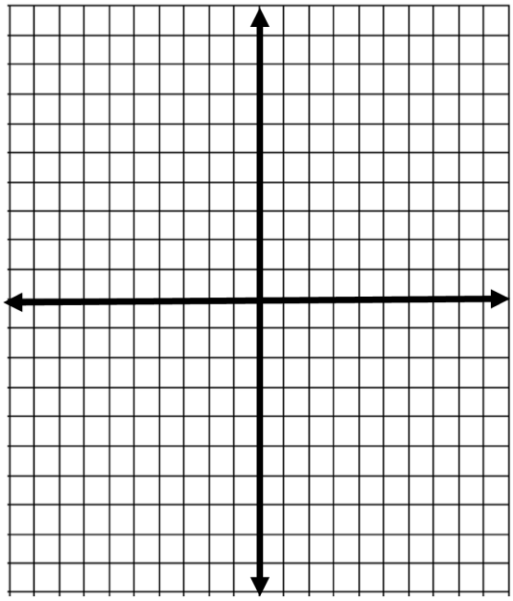


For Problem 11-17, graph the inequality given.

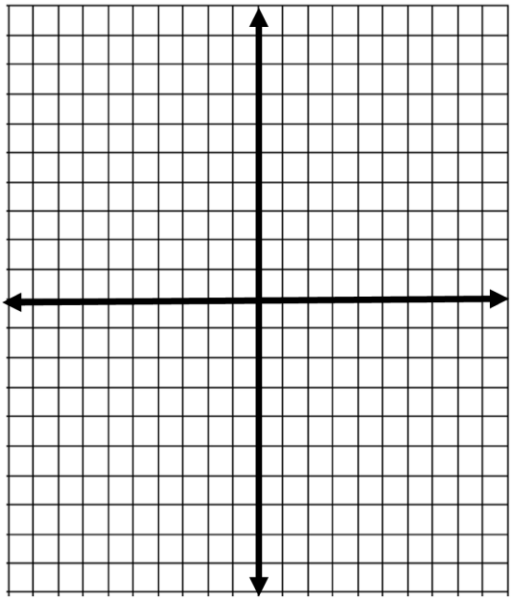
11. $y > 4x + 3$



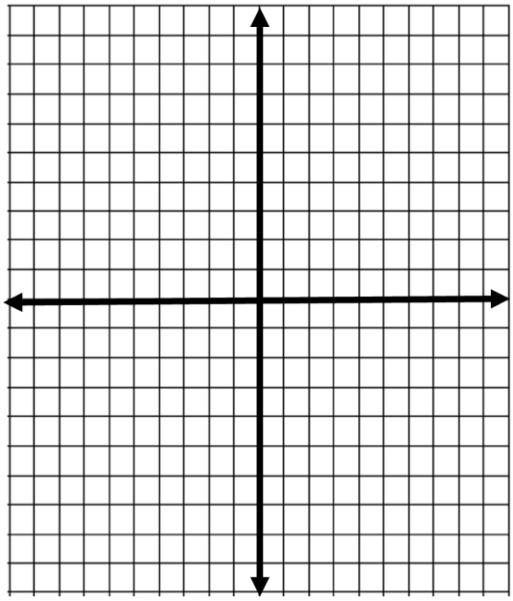
12. $y \leq 4x + 3$



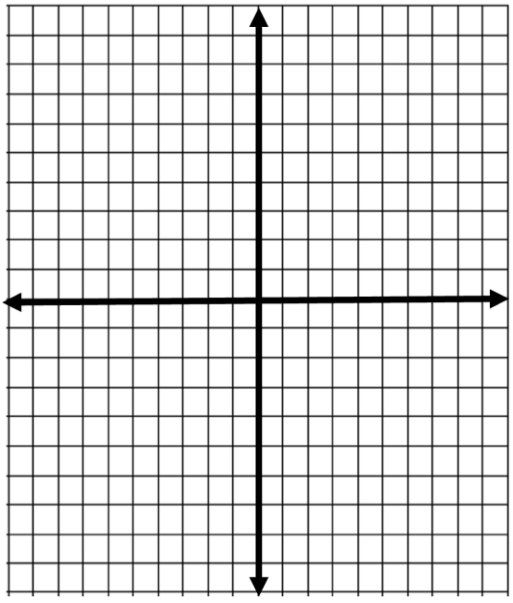
13. $y < 2$



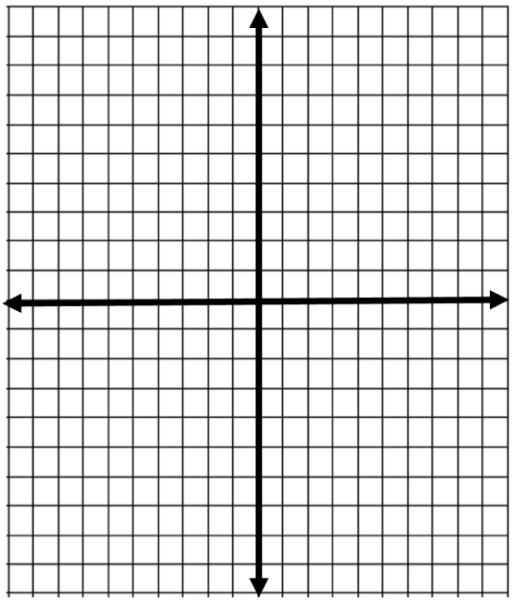
14. $x \geq 0$



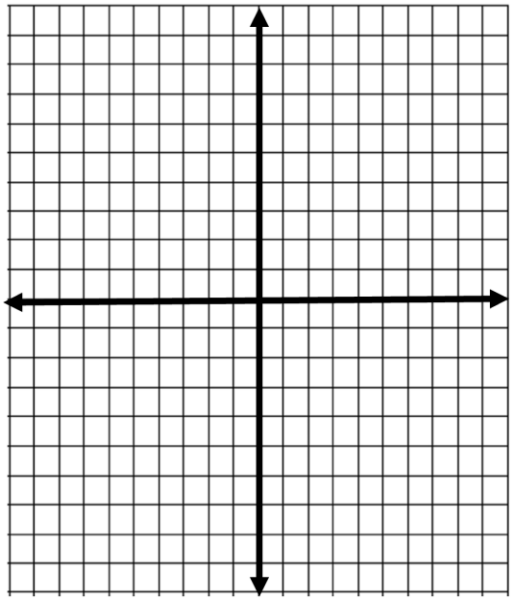
15. $2y > 4x + 2$



16. $3x + 3 > 9$



17. $5 - y \leq 2$



For Problem 18-20, solve the word problem given.

18. Which point satisfies the inequality in Problem 17: $(2, -3)$ or $(2, 3)$? Check your solution.

19. In the inequality $5x + y \leq 20$, is the boundary line solid or dashed?

20. In the inequality in Problem 19, is the region above or below the boundary line shaded?

Section 2.12 Solving Systems of Inequalities

Practice Problems 2.12

For Problem 1-4, use the Hinkle game to solve the problem.

1. Hinkle is located at $y \leq 0$. In which quadrants and on which axis could Hinkle be hiding?

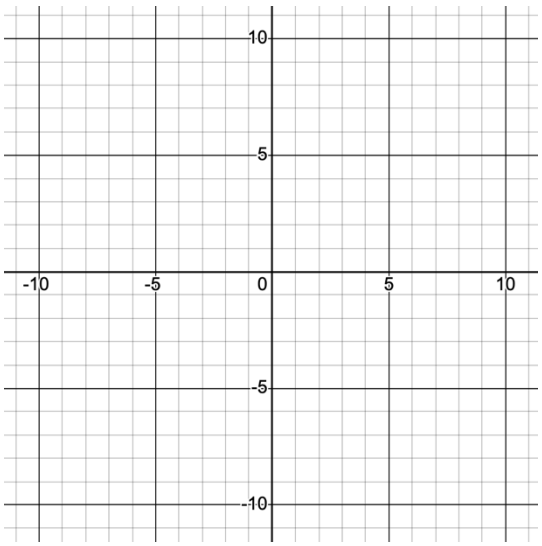
2. If your partner asks: "Is Hinkle hiding at $x < 0$?" and your answer is "yes," in which quadrant(s) could Hinkle be hiding?

3. If you answer "yes" for "Is Hinkle hiding at $x > 0$?" then is he on the x-axis, y-axis, or neither?

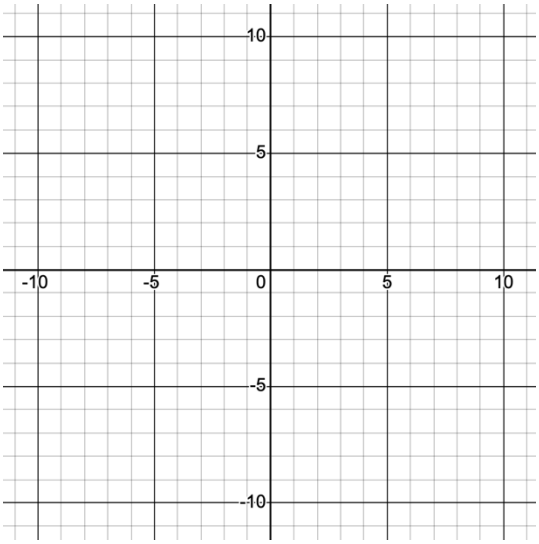
4. If you know Hinkle is in Quadrant IV, x-the maximum is 8, and the y-minimum is 8, what is the next most favorable question to ask to find Hinkle?

For Problem 5-9, graph the solution set for the system of inequalities given.

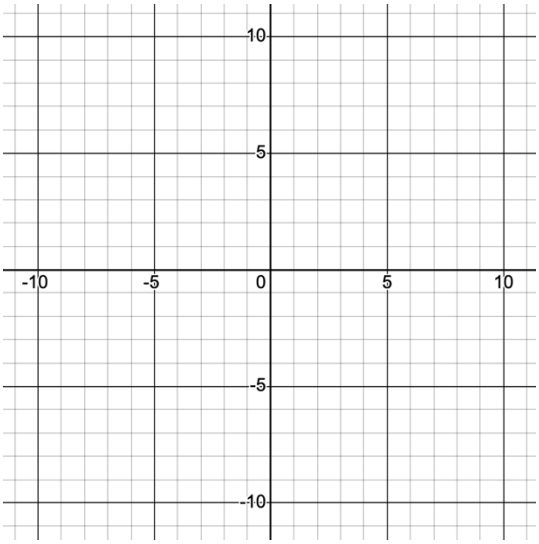
5. $\begin{cases} 2x - y > 4 \\ y > -1.5x + 3 \end{cases}$



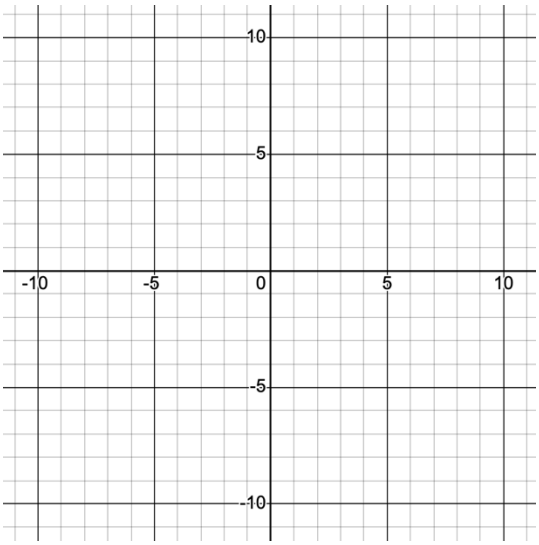
6. $\begin{cases} 7x + 14y \leq 21 \\ y < -x + 6 \end{cases}$



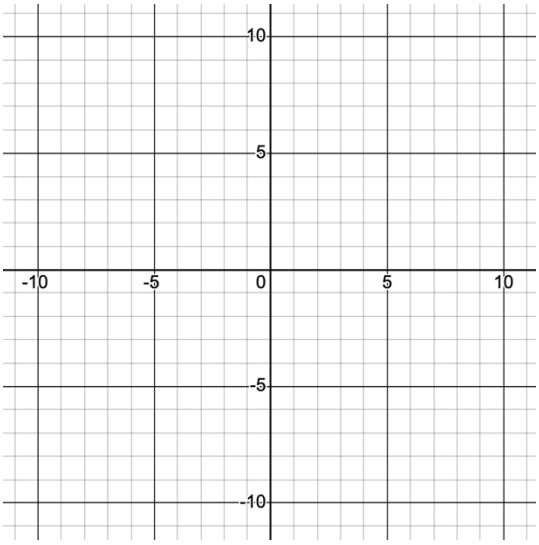
7. $\begin{cases} -3x + 2y \leq -4 \\ x + y > 2 \end{cases}$



8. $\begin{cases} 3x + 2y \geq 6 \\ 2x - y \leq 6 \end{cases}$



9. $\begin{cases} y > -6 \\ x < 4 \end{cases}$



For Problem 10, play the game "Where is Hinkle Hiding?" with a partner on the coordinate grid. Use inequality questions that can only be answered "yes" or "no." See who can guess where Hinkle is hiding with the least number of questions!

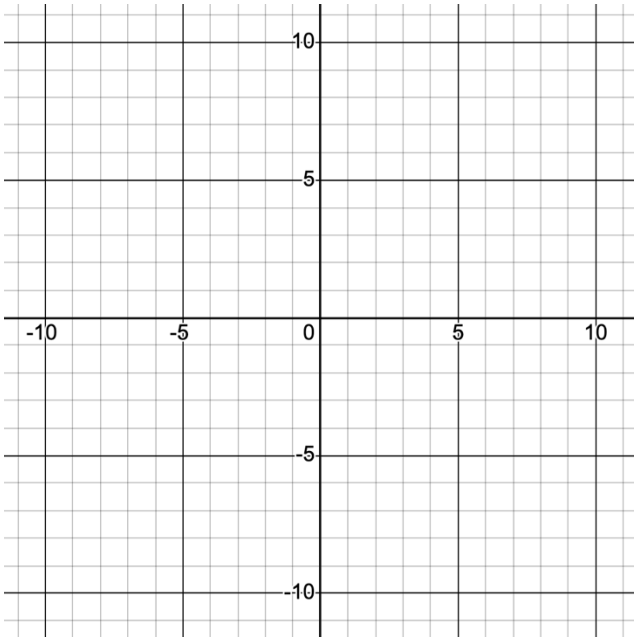
Section 2.13 Optimization Problems

Practice Problems 2.13

For Problem 1-3, graph the system of inequalities given. Shade the feasible region and label the corner points.

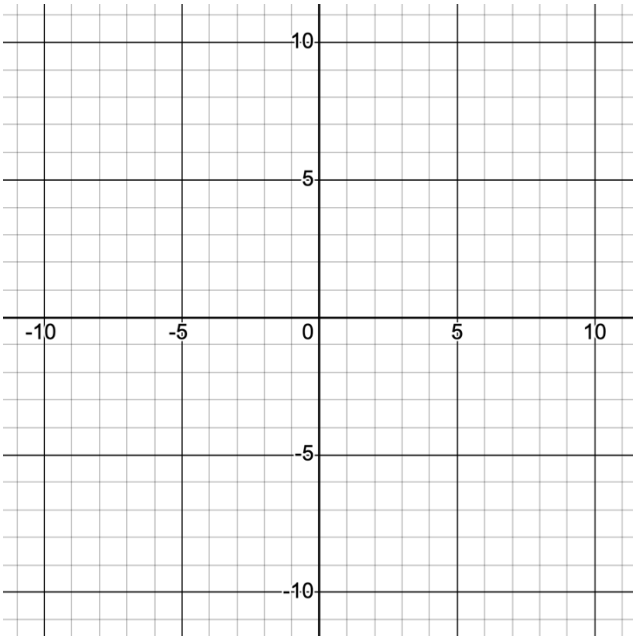
1.

$$x > 0$$
$$y \geq 0$$
$$5x + 3y \leq 15$$



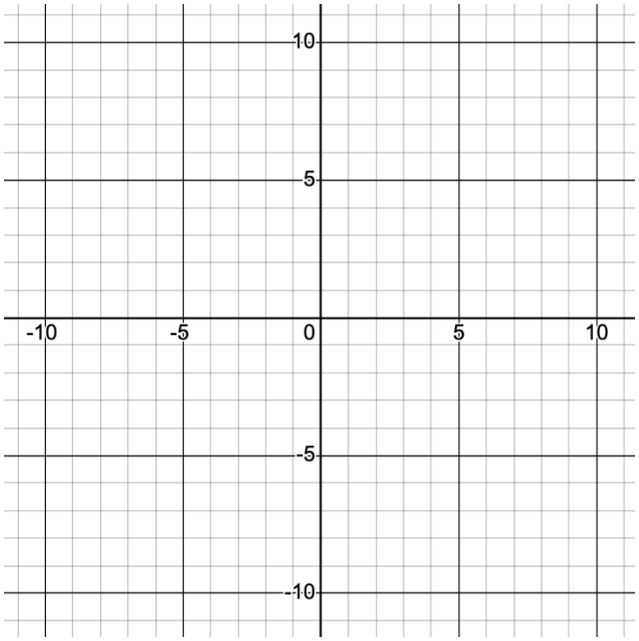
2.

$$y \leq -\frac{3}{2}x + 1$$
$$x \geq -4$$
$$y \geq -1$$
$$y \leq 3$$



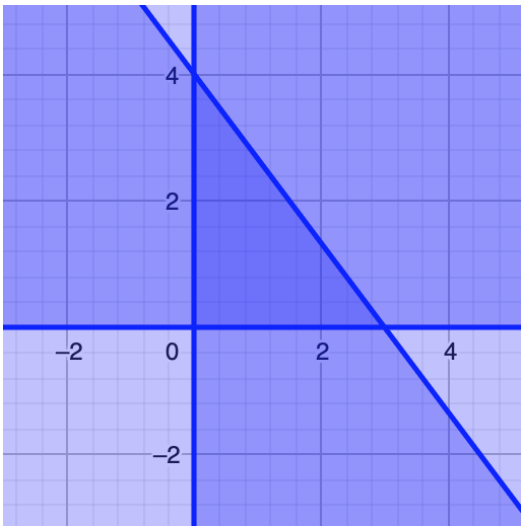
3.

$$x + 2y \geq 1$$
$$x \leq 3$$
$$y \geq -1$$
$$y \leq 3$$



For Problem 4 and 5, describe the feasible region in the graph given and name the corner points.

4.



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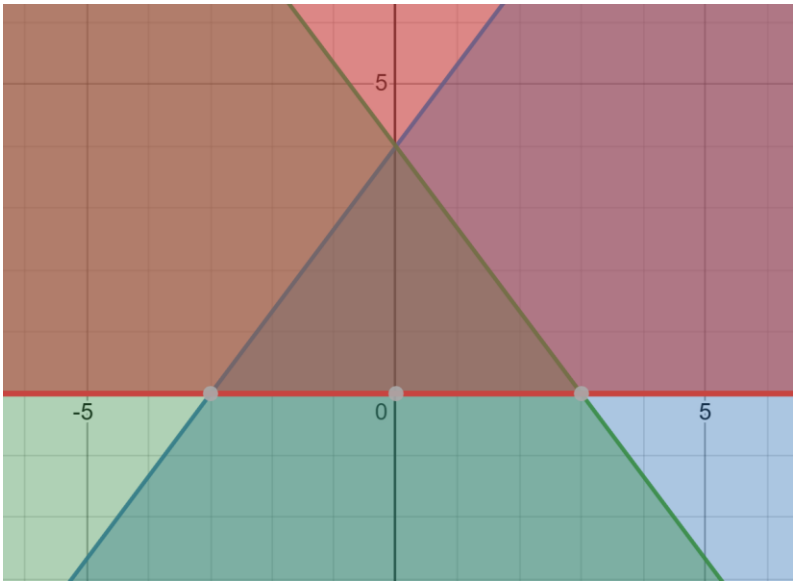


For Problem 6, use the given information to solve the problem.

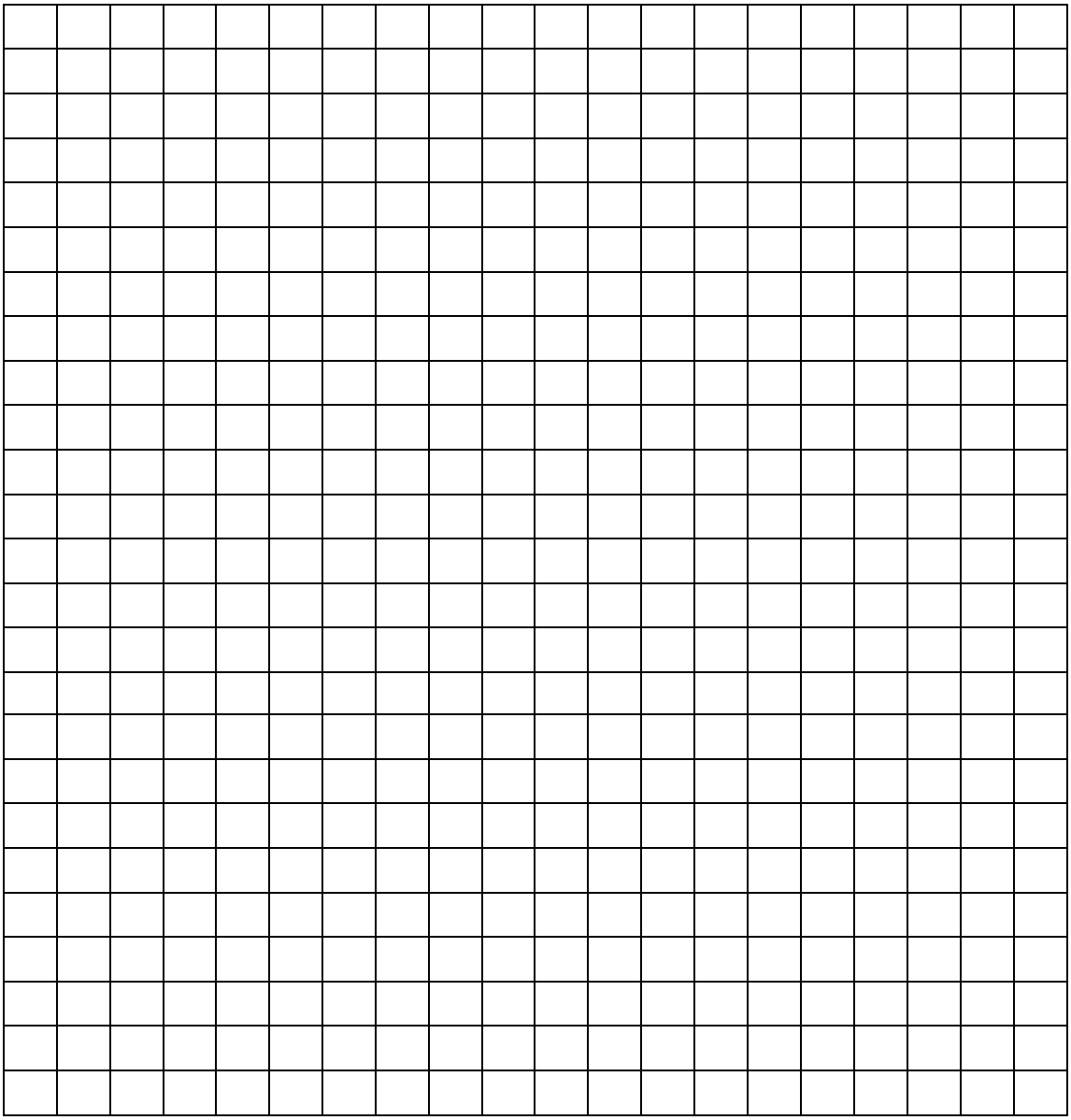
A group of four friends has $45.00 to spend on soft drinks and pizza. They each want a soft drink that are $2.00 each. Toppings are $0.50 each and the pizzas are $9.00 each. Let p be the number of pizzas and t be the number of toppings.

6. If $p \geq 1$ and $t \geq 1$, what is the final inequality for the possible number of pizzas with toppings and soft drinks the group can afford to purchase?

For Problem 7-10, use the given information to solve the problem.

In a basketball game, a player scores at least six 2-point baskets, and at least five 1-point free-throws. He scores no more than 22 points.

7. Let the x-axis represent the 2-point shots and the y-axis represent the 1-point shots. Write three inequalities and graph them on one coordinate plane. Shade the region of the intersection of all three graphs.



8. Is the point $(7, 8)$ on the boundary line of the inequalities represented in the graph in Problem 7. What does that mean?

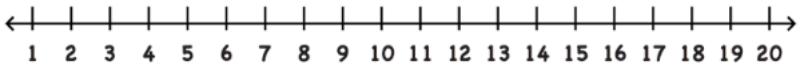
9. The point $(8, 10)$ is outside of the boundary region. What does that mean?

10. Find the corner points of the inequality and tell what they are.

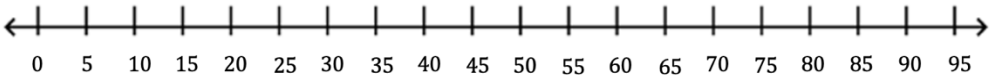
Section 2.14 Module Review

For Problem1-8, solve and graph the inequality given.

1. A company pays up to $12.25 per hour for part-time help, but no less than minimum wage, which is $7.74 per hour.



2. Jeremy weaves dream catchers and wants to make at least $375.00 more for his trip to India. He sells them for $3.95 each. How many dream catchers will Jeremy need to sell to be able to make his trip to India?



3. $16 \geq 5n - 4$

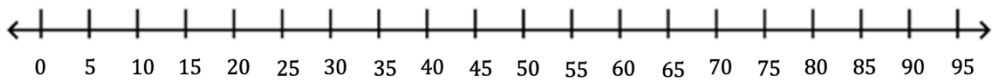
4. $t \leq -2$ or $t \geq 2$

5. $p < 1$ and $p > -2$

6. $5 \geq 2m - 5 \geq -15$

7. $\frac{t+1}{3} \geq 2$

8. $\frac{z+2}{9} < 5$



For Problem 9 and 10, solve the absolute value equation given.

9. $|x| - 4 = 2.8$

10. $4|y + 2| = 20$

For Problem 11 and 12, solve the absolute value inequality given and graph the solution on the number line.

11. $|q + 4| \leq 4$

12. $|5b - 3| \geq 12$

For Problem 13-16, solve the system of equations given using a graph, or the substitution or elimination method. Tell whether the system has no solution, one solution, or infinite solutions. If there is one solution, find it $((x, y))$.

13. $\begin{cases} -3x + y = 1 \\ x - 3y = 1 \end{cases}$

14. $\begin{cases} 3x + 5y = -26 \\ x + 4y = -4 \end{cases}$

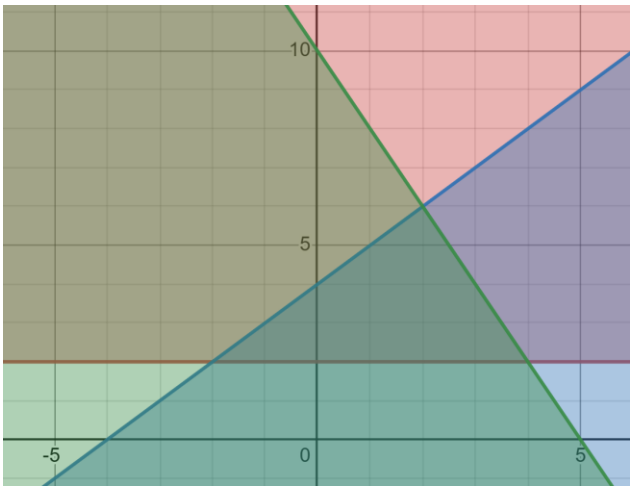
15. $\begin{cases} x + 2y = 5 \\ 2x + 4y = 10 \end{cases}$

16. $\begin{cases} 8x + 7y = 25 \\ 10x + 9y = 35 \end{cases}$

For Problem 17-20, solve the word problem given.

17. At a restaurant, Humphrey orders 3 coffees and 4 ice teas for his coworkers and the bill is \$11.33. Angelica orders 9 coffees and 5 ice teas at the same restaurant for her employees and the bill is \$23.56. How much is a cup of coffee and how much is an iced tea at this restaurant?

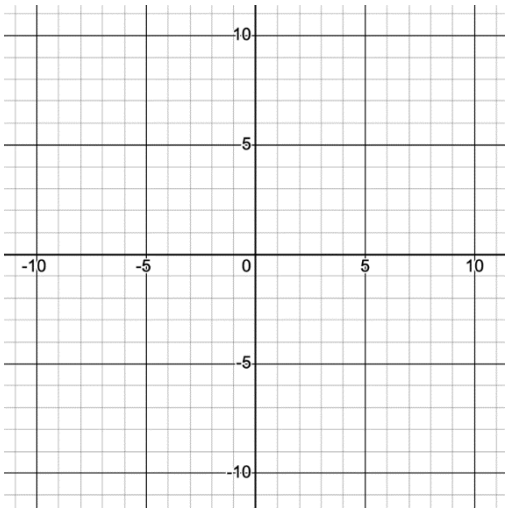
18. Write the system of linear equations to describe the shaded area below. Name the corner points.



19. A church is giving away a $500.00 youth conference scholarship. They are selling chocolate peanut butter Easter eggs for between $1.25 and $1.75 each to do so. They would like to give away more scholarships depending on the profits for the Easter eggs. They intend to make 1,200 eggs. Is it possible to give at least four scholarships if they sell all 1,200 eggs? (The supplies are donated by parents so there is no cost.)

20. Graph the system of linear inequalities. Shade the feasible region. Convert the second equation to y in terms of x first.

$$y < x$$
$$x + 2y > 6$$



Section 2.15 Module Test

For Problem 1 and 2, write an inequality to represent the situation given.

1. A dance instructor gives lessons for $25.00 per hour for a few individuals but allows discounts at a rate of $15.00 an hour for groups.

2. Kirsten is buying cancer awareness stickers for her friends and family. She needs to buy at least 57 to make sure she has enough. They cost $1.25 each. How much money does Kirsten need to get out of her account to pay for them?

For Problem 3-8, solve the inequality given and graph the solution.

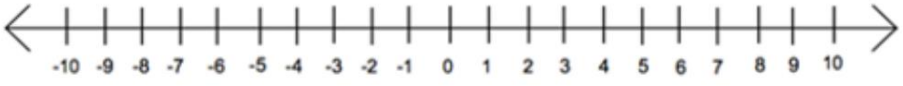
3. $5m - 4 \leq 11$

4. $n \leq 3$ or $n \geq 5$

5. $p < -1$ and $p > -5$

6. $-2 \leq t - 8 \leq 2$

7. $1 \leq \frac{s}{4} + 2$



8. $5 + \frac{q}{2} \geq 1$

For Problem 9-12, solve the absolute value equation given.

9. $|y| + 7 = 3.4$

10. $3|n| - 4 = 23$

11. $|l - 2| < 12.2$

12. $|6b + 8| \geq 20$

For Problem 13-16, solve the system of equations given using a graph, or the substitution or elimination method. Tell whether the system has no solution, one solution, or infinite solutions. If there is one solution, find it $((x, y))$.

13. $\begin{cases} x - 4y = 14 \\ x - 6 = 0 \end{cases}$

14. $\begin{cases} -12x + y = -14 \\ 3x + 2y = 26 \end{cases}$

15. $\begin{cases} \frac{1}{2}x + y = 2 \\ 2x + 4y = 8 \end{cases}$

16. $\begin{cases} y = -4x + 2 \\ y = -4x - 3 \end{cases}$

For Problem 17-20, solve the word problem given.

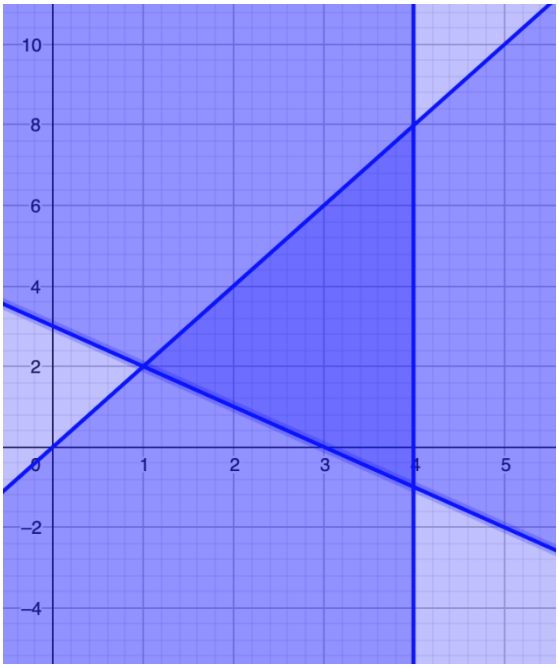
17. Senior year picture packages offer the combinations below. (Other sizes are sold separately.)

Standard	Premium
- 2 sheets of wallet photos - Two 5" × 7" photos	- 5 sheets of wallet photos - Three 5" × 7" photos

a) If the standard package is $22.80 and the premium package is $41.40, how much are you spending for each wallet-sized sheet of photos and each 5" × 7" photos?

b) Wallet-sized sheets sell individually for $4.95 each, and 5" × 7" photos are $9.95 each. How much are you saving on each package?

18. Find the system of inequalities that represent the shaded area below. What are the corner points?



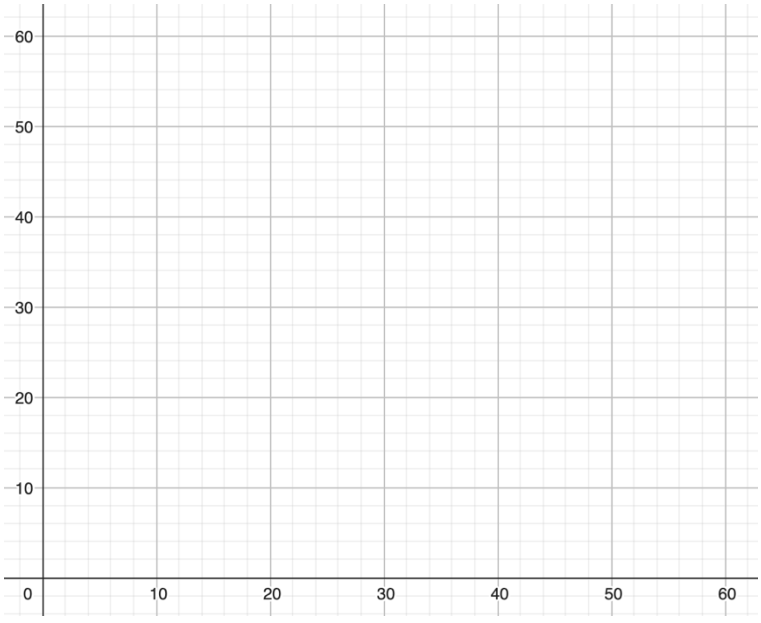
19. Kids eat free at the McTees restaurant on Tuesday between 4:00 PM and 8:00 PM. There must be at least one adult to accompany a child. (That means an adult cannot come alone and a child cannot come alone.) There must be at least one adult for every two children. (That means that one adult cannot bring three or four children, but they can bring one or two.) The maximum number of persons allowed in the restaurant at any one time according to the fire code is sixty people.

a) Is it possible to have ten adults and fifty children?

b) Could there be fifty adults and ten children in the restaurant?

c) Is it possible, given the constraints, to have thirty of each children and adults in the restaurant?

Write the inequalities and graph the solutions.



20. Graph the linear inequalities below. Convert to y in terms of x first.

$$\begin{cases} x + y > 2 \\ x - y \leq 4 \\ x \leq 5 \end{cases}$$