Name: Systems | 2.1

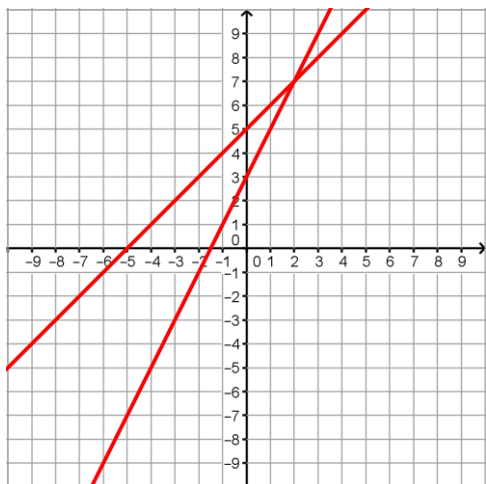## Ready, Set, Go!

Ready
Topic: Determine if given value is a solution and solve systems of equations

1. Graph both equations on the same axes. Then determine which ordered pair is a solution to the system of linear equations.

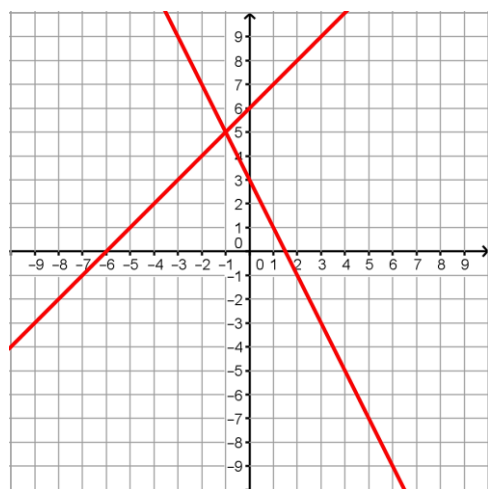 $y = 2x + 3$ and $y = x + 5$

   a. $(2, 7)$

   b. $(-7, 11)$

   c. $(0, 5)$

2. Solve the following system by graphing. Check the solution by evaluating both equations at the point of intersection.

   $y = x + 6$ and $y = -2x + 3$

   $(-1, 5)$

Topic: Determining if given values are solutions to an equation

3. Identify which of the given points are solutions to the following linear equation. Then graph the equation.
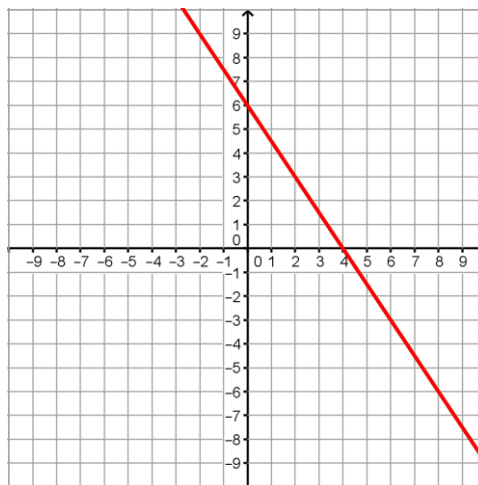
$3x + 2y = 12$

a. $(2, 4)$
   No

b. $(3, 2)$
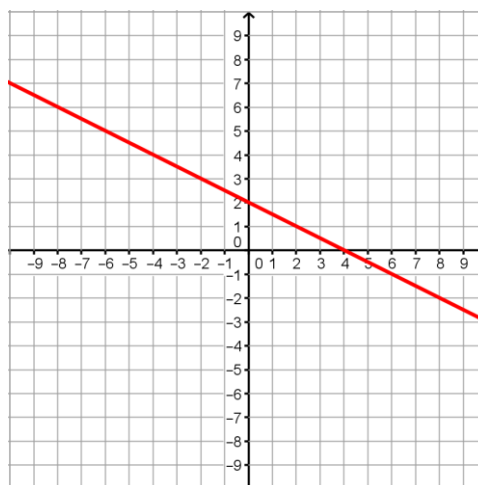   *No*

c. $(4, 0)$
   Yes

d. $(0, 6)$
   Yes

Find the value that will make each ordered pair a solution to the given equations. Then graph each equation.

4. $2x + 4y = 8$

a. $(2, \underline{\mathbf{1}})$
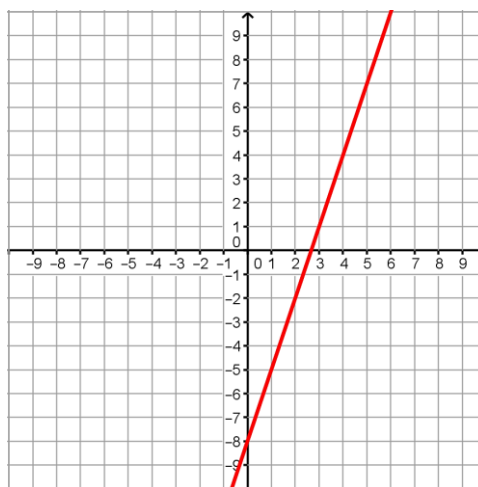
b. $(0, \underline{\mathbf{2}})$

c. $(\underline{\mathbf{4}}, 0)$

5. $3x - y = 8$

a. $(2, \underline{\mathbf{-2}})$

b. $(0, \underline{\mathbf{-8}})$

c. $\left(\dfrac{\mathbf{8}}{\mathbf{3}}, 0\right)$

Set

Topic: Determining possible solutions

6. a. A theater wants to take in at least $2000 for a certain matinee. Children's tickets cost $5 each and adult tickets cost $10 each. The theater can seat up to 350 people. Find five combinations of children and adult tickets that will make their goal.

   A few examples are:
   1. *150 adults and 100 children*
   2. *100 Adults and 200 children*
   3. *300 adults and 50 children*
   4. *250 adults and 100 children*
   5. *200 adults and 150 children*

   b. Plot those points on the graph below, then find and plot five additional combinations of children and adult tickets that will make their goal.

   Teacher Note: Do not have students graph the inequalities, just help them to notice that their solutions seem to be grouped together

   New Examples:
   1. *200 adults and 100 children*
   2. *250 adults and 50 children*
   3. *100 adults and 225 children*
   4. *150 adults and 150 children*
   5. *200 adults and 50 children*
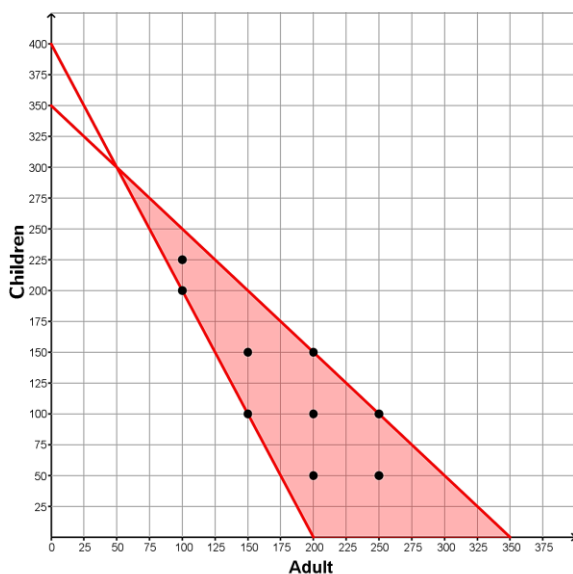
Topic: Graph linear inequalities

7. $4x - 2y \geq 6$

   a. Solve for y.

      y ≤ 2x − 3

   b. Now imagine that your inequality is an equation. In other words, your solution will say $y =$, instead of $y \geq$, or $y \leq$. With the equal sign, it should be the equation of a line. Graph your equation.

   c. Find the y–intercept. **$(0, -3)$**

   d. Find the slope. **2**

   e. Select a point that is above the line. **$(0, 0)$**
      Replace the x and y–values in the inequality:
      $4x - 2y \geq 6$
      Is the inequality still true? **No**
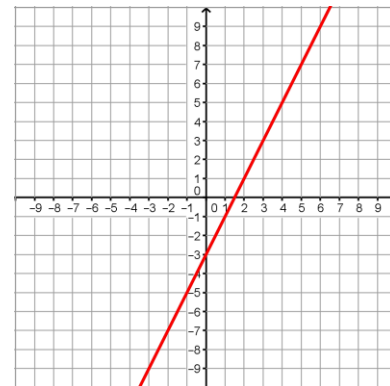
   f. Select a point that is below the line. **$(0, -5)$**
      Replace the x and y–values in the inequality: $4x - 2y \geq 6$
      Is the inequality still true? **Yes**

   g. Explain which side of the line should be shaded.

      Below the line

   h. Decide whether the line should be solid or dotted. Justify your decision.

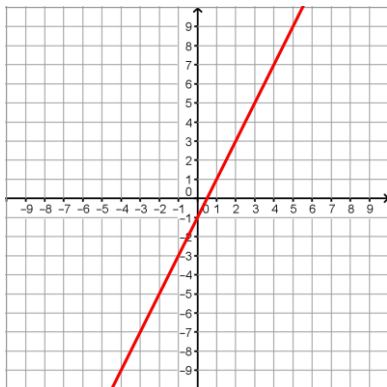   ***Solid because when a point on the line is tested the inequality is still true.***

Go

Topic: Graphing linear equations and determining if a given value is a solution

Graph each equation below, then determine if the point $(3, 5)$ is a solution to the equation. Name two additional points that are solutions to the equation and show these points on the graph.
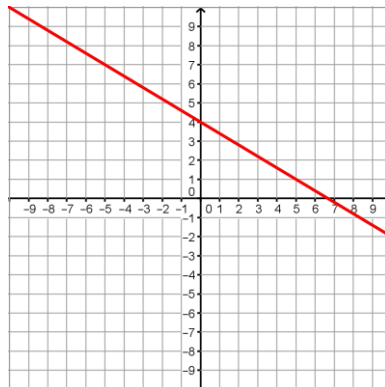
8. $y = 2x - 1$

Yes $(0, -1)$ and $(1, 1)$

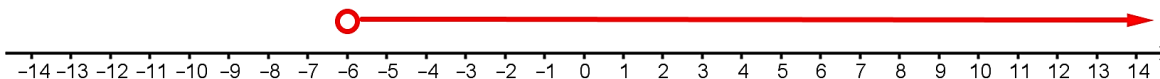9. $y = -\frac{3}{5}x + 4$

No $(0, 4)$ and $(5, 1)$

Topic: Solving inequalities

Follow the directions for each problem below. (Show your work!)

10. $10 - 3x < 28$

a. Solve for x. Then graph the solution on the number line.

$x > -6$

b. Select an x-value from your graph of the solution of the inequality. Replace x in the original inequality $10 - 3x < 28$ with your chosen value. Does the inequality hold true?

$10 - 3(0) < 28$
$10 < 28$ TRUE

c. Select an x-value that is outside of the solution set on your graph. Replace x in the original inequality $10 - 3x < 28$ with your chosen value. Does the inequality still hold true?
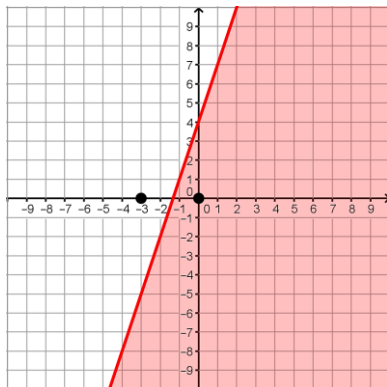
$10 - 3(-7) < 28$
$31 < 28$ FALSE

Topic: Graph linear inequalities

Graph the following inequalities on the coordinate plane. Name one point that is a solution to the inequality and one point that is not a solution. Show algebraically and graphically that your points are correct.
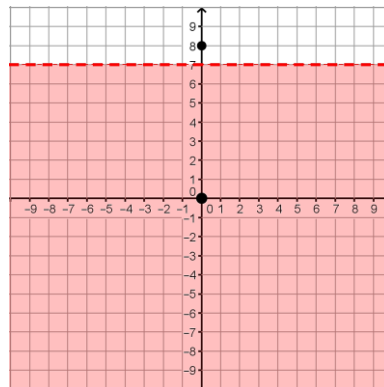
11. $y \leq 3x + 4$
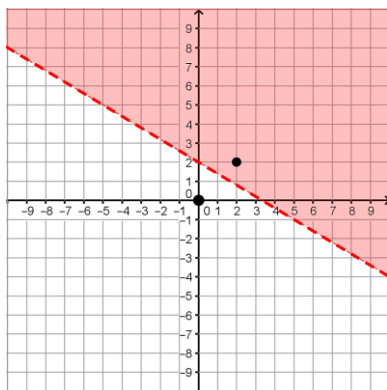
Solution: $(0, 0)$
Not a solution: $(-3, 0)$

12. $y < 7$

Solution: $(0, 0)$
Not a solution: $(0, 8)$

13. $y > -\frac{3}{5}x + 2$

Solution: $(2, 2)$
Not a solution: $(0, 0)$

Name: **Systems** | **2.2**

Ready, Set, Go!

Ready

Topic: Determining points that satisfy equations and solving systems of equations

Three points are given. Each point is a solution to at least one of the equations. Find the point that satisfies <u>both</u> equations. (This is the solution to the system) Justify that the point is a solution to both equations and that the others are not.

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

   a. $(-2, 5)$

   b. $(2, 1)$

   c. $(4, 5)$

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

   a. $(-1, 0)$

   b. $(6, -3)$

   c. $(0, 3)$

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

   a. $(7, 2)$

   b. $(2, -14)$

   c. $(-2, 2)$

4. $\begin{cases} y = 2x + 4 \\ x + y = -5 \end{cases}$
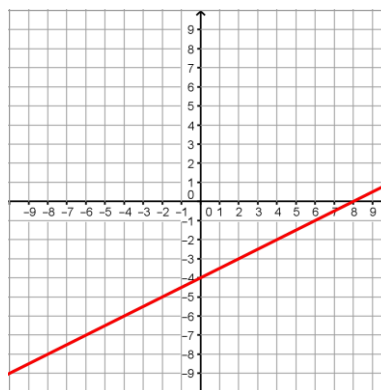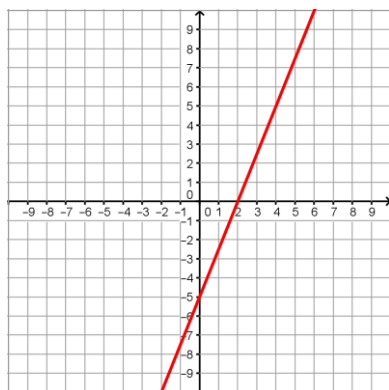
   a. $(1, 6)$

   b $(-3, -2)$

   c. $(2, -7)$

Set
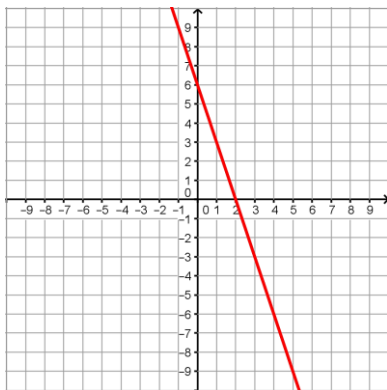Topic: Graphing linear equations from standard form using intercepts

Graph the following equations by finding the intercepts.
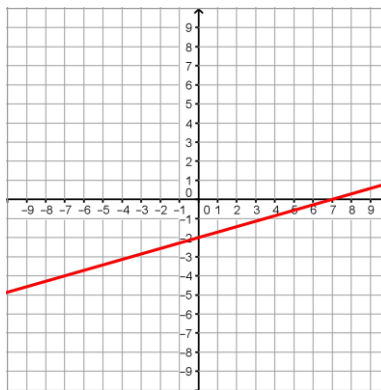
5. $5x - 2y = 10$

6. $3x - 6y = 24$

7. $6x + 2y = 12$

8. $-2x + 7y = -14$

Go

Topic: Solving equations containing fractions and decimals.

Solve the following equations. Check your solutions.

9. $m - 3 = \frac{4}{5}m - 2$

$m = 5$

10. $\frac{w}{4} + \frac{11}{12} = \frac{1}{2} - \frac{w}{6}$

$w = -1$

11. $2a - 0.4 = 1 + 1.8a$

$a = 7$

12. $0.5(p + 3) = 3(0.1 + 0.16p)$

$p = -60$

Name: _____   **Systems** | **2.3**

Ready, Set, Go!

Ready
Topic: Substitution

Determine whether $h = 3$ is a solution to each problem.

1. $3(h - 4) = -3$

   Yes

2. $3h = 2(h + 2) - 1$

   Yes

3. $2h - 3 = h + 6$

   No

4. $3h > -3$

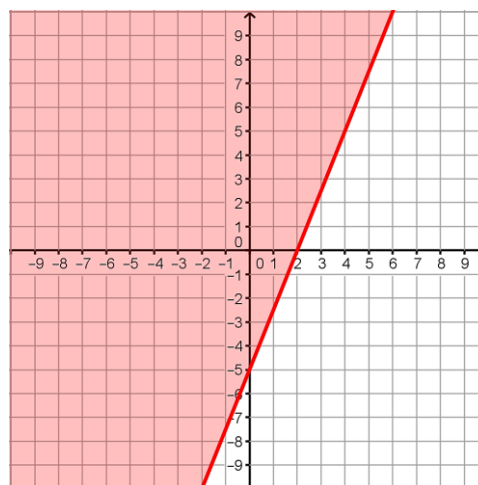   *Yes*

5. $\frac{3}{5} = h \times \frac{1}{5}$

   Yes

Topic: Graphing two variable inequalities

For each inequality and graph, pick a point and use it to determine which half-plane should be shaded, then shade the correct half-plane.

6. $y \leq \frac{1}{5}x - 4$
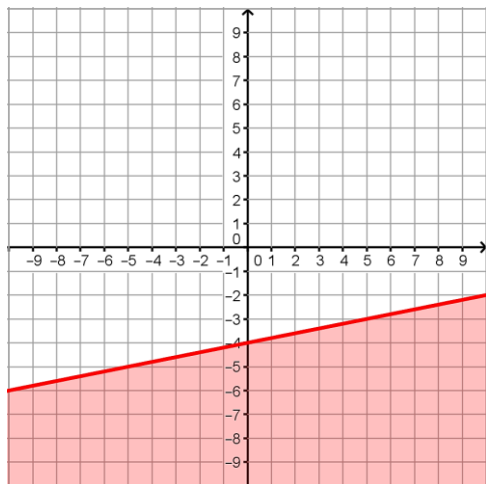
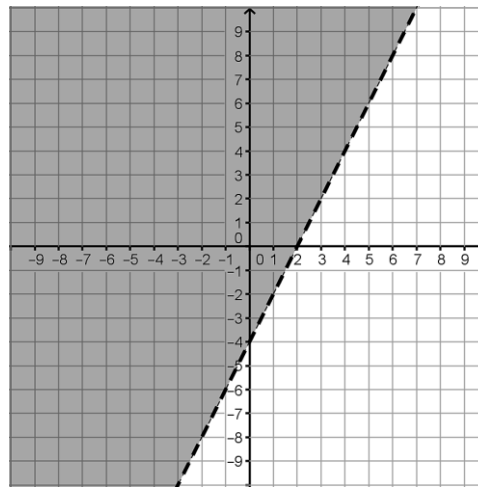7. $5x - 2y \leq 10$

Set

Topic: Writing two variable inequalities

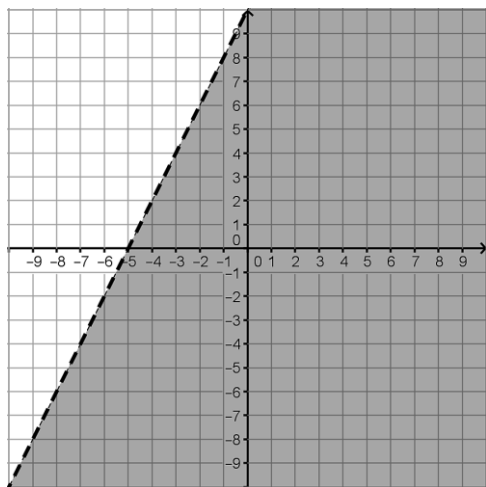**Given the graph with the regions that are shaded write the inequality.**

8.
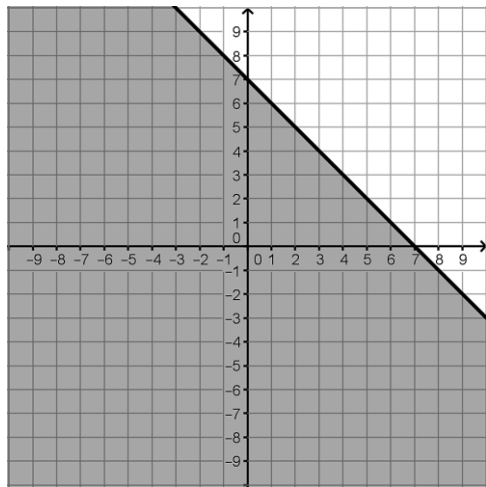
$y \leq -x + 7$

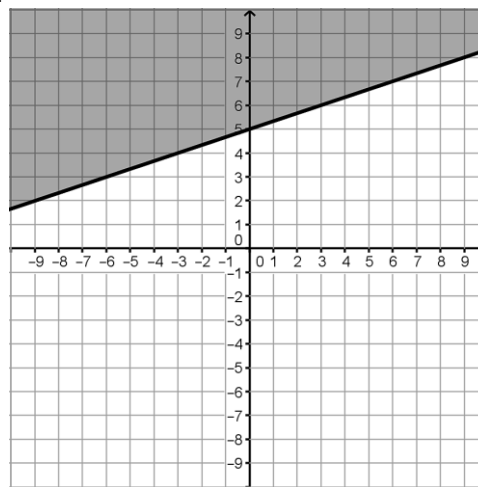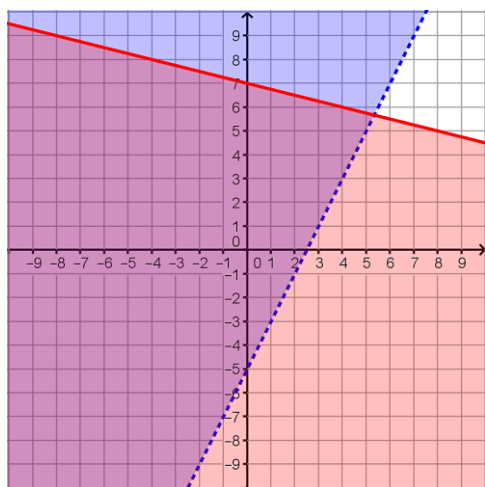9.

$y > 2x - 4$

10.

$y < 2x + 10$

11.

$y \geq \frac{1}{3}x + 5$
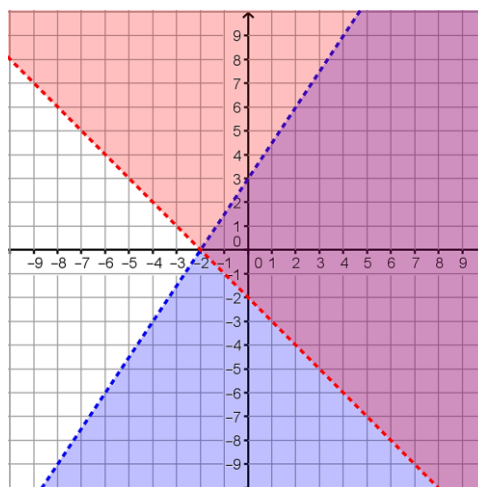
Topic: Graphing systems of inequalities.

Graph each system of inequalities. Be sure to darken in the solution set.

12. $y > 2x - 5$

    $y \leq -\dfrac{1}{4}x + 7$

13. $2y < 3x + 6$

    $y \geq -x - 2$

Go

Topic: Solve literal equations

Re-write each of the following equations for the indicated variable.

14. $3x + 5y = 30$ for y

    $y = -\dfrac{3}{5}x + 6$

15. $24x + 6y = 360$ for x
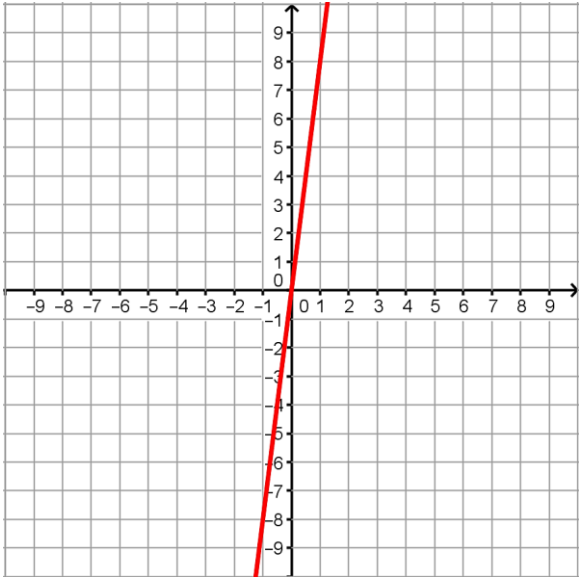
    $x = -\dfrac{1}{4}y + 15$
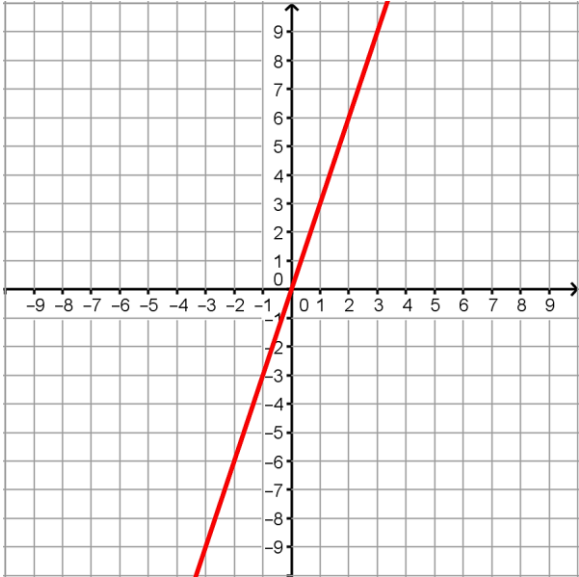
16. $\dfrac{1280 - 80d}{32} = c$ for d

    $d = -\dfrac{2}{5}c + 16$

Topic: Proportional relationships

For each proportional relationship below, one representation is provided. Show the remaining representations and explain any connections you notice between representations.

17. **Equation**: $y = 8x$	Graph

Table

Days	Cost
1	8
2	16
	24
4	32

Create a Context
answers vary

18. **Equation**: $y = 3x$	Graph

Table

x	y
0	**0**
1	**3**
2	**6**
3	**9**
4	**12**
5	**15**
6	**18**

Create a Context
answers vary

Name:

Ready, Set, Go!

Ready
Topic: Solving equations

Determine the value of *x* that makes each equation true.

1. $4x - 2 = 8$

   $x = \dfrac{5}{2}$

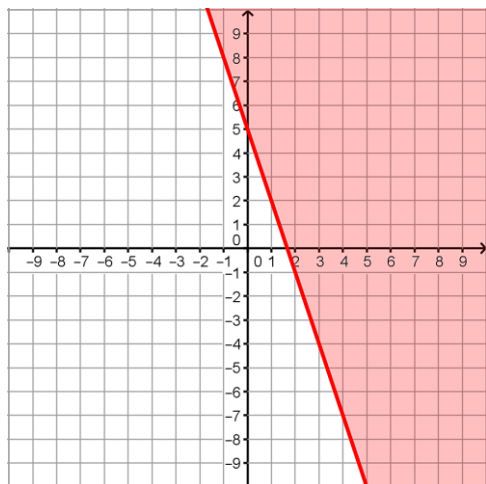2. $3(x + 5) = 20$

   $x = \dfrac{5}{3}$

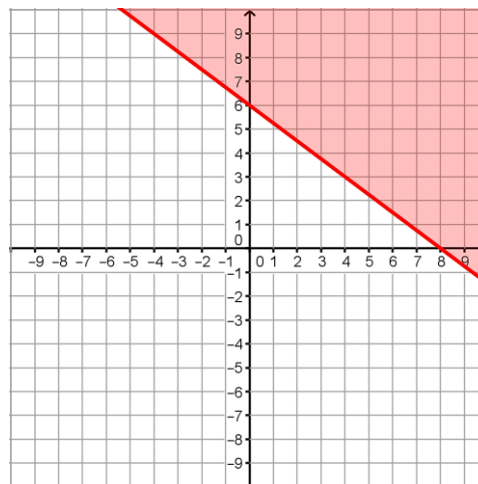3. $2x + 3 = 2x - 5$

   $3 \neq -5$ *No Solution*

Topic: Graphing two variable inequalities

For each inequality and graph, pick a point and use it to determine which half-plane should be shaded, then shade the correct half-plane.

4. $y \geq -3x + 5$

5. $3x + 4y \geq 24$

Set

Topic: Creating equations, solving real world problems, solve systems of equations

A phone company offers a choice of three text-messaging plans. Plan A gives you unlimited text messages for $10 a month; Plan B charges you $5 a month and plus $0.05 for each text message you send; and Plan C has no monthly fee but charges you $0.10 per message.

6. Write an equation for the monthly cost of each of the three plans.

   Plan A: $c = 10$
   Plan B: $c = 5 + 0.05x$
   Plan C: $c = 0.1x$

7. If you send 30 messages per month, which plan is cheapest?

   Plan C

8. What is the cost of each of the three plans if you send 50 messages per month?

   Plan A: $10
   Plan B: $7.50
   Plan C: $5

9. Determine the values for which each plan is the cheapest?
   Plan A when more than 100 texts are sent
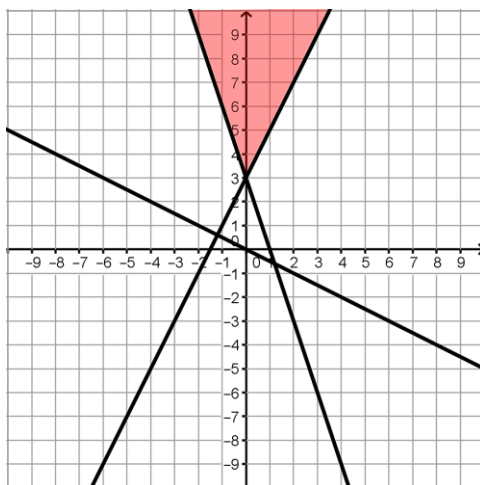   *Plan C when less than 100 texts are sent*

Topic: Solutions to systems of linear inequalities

10. Shade the solution to the following system on the graph below:
$$y - 2x \geq 3$$
$$y \geq -\frac{1}{2}x$$
$$y \geq -3x + 3$$

Go

Topic: Solve literal equations

Re-write each of the following equations for the indicated variable.

11. $Ax + By = C$ for y

$$y = -\frac{A}{B}x + \frac{C}{B}$$
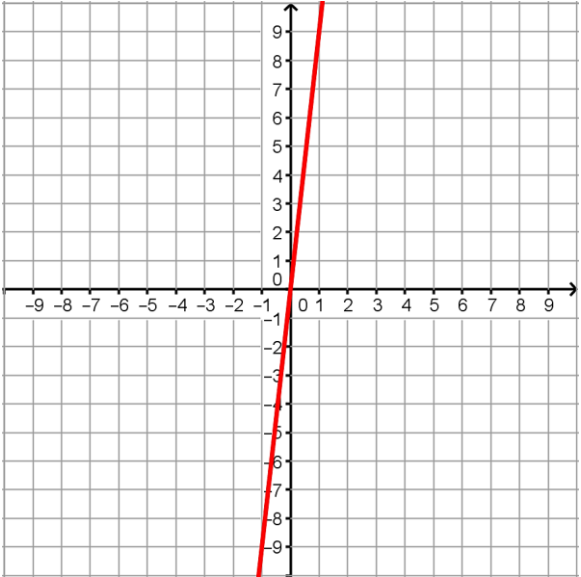
12. $C = \frac{5}{9}(F - 32)$ for F

$$F = \frac{9}{5}c + 32$$

13. $y = mx + b$ for b

$$b = -mx + y$$

Topic: Proportional relationships

For each proportional relationship below, one representation is provided. Show the remaining representations and explain any connections you notice between representations.

14. **Equation**: $y = 9x$	Graph
Table 	

week	allowance
1	9
2	18
3	27
4	36
5	45
6	54
7	63

Create a Context

Claire earns $9 per week allowance

15. **Equation**: $y = -x + 9$	**Graph**

Table

x	y
−3	12
−2	11
−1	10
0	9
1	8
2	7
3	6

Create a Context

answers vary
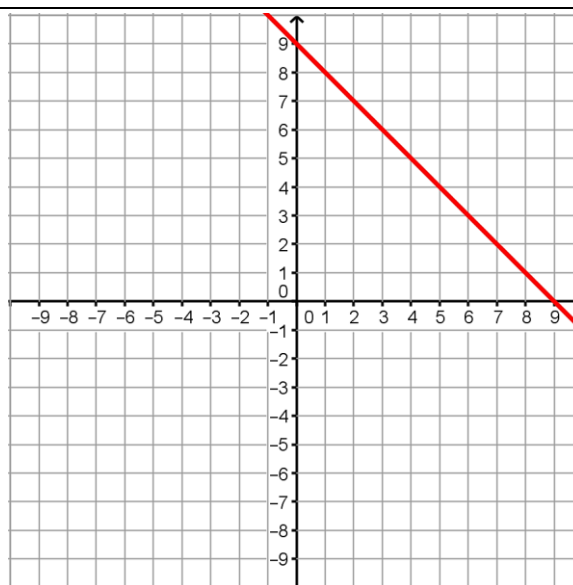
Name: **Systems** | **2.5**

Ready, Set, Go!

Ready

Topic: Determine patterns

**Find the next two values in the pattern. Describe how you determined these values.**

1. 3, 6, 9, 12, __*15*___, __*18*___   Description: *Add 3 for the next number in the pattern*

2. 3, 6, 12, 24, __*48*___, __*96*___   Description: *Multiply by 2 to get the next number in the pattern*

3. 24, 20, 16, 12, __*8*___, __*4*___   Description: *Subtract 4 for the next number in the pattern*

4. 24, 12, 6, 3, __*3/2*___, __*3/4*___   Description: *Divide by 2 for the next number in the pattern*
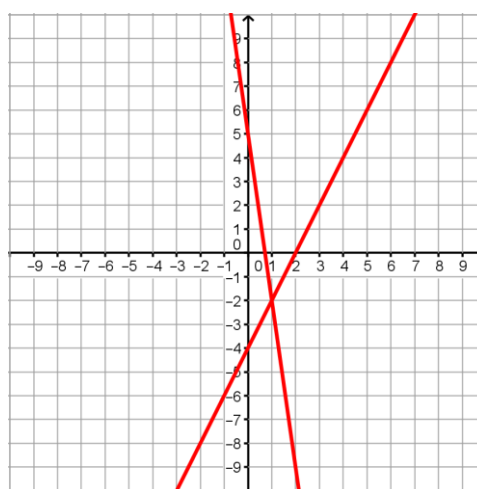
Set
Topic: Solve systems of equations using substitution

For questions 5-8 solve the system of equations using substitution. Check your work by graphing.

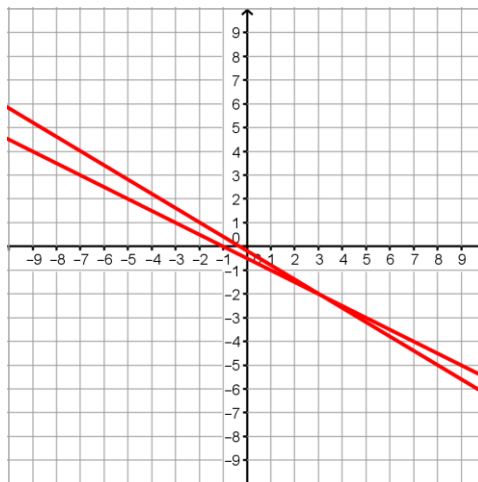5. $\begin{cases} x + 2y = 9 \\ 3x + 5y = 20 \end{cases}$

(−5, 7)
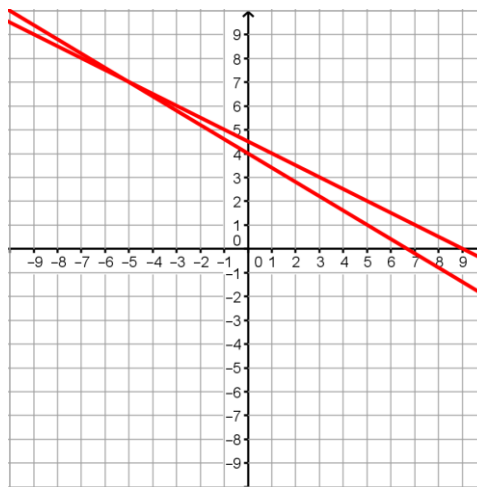
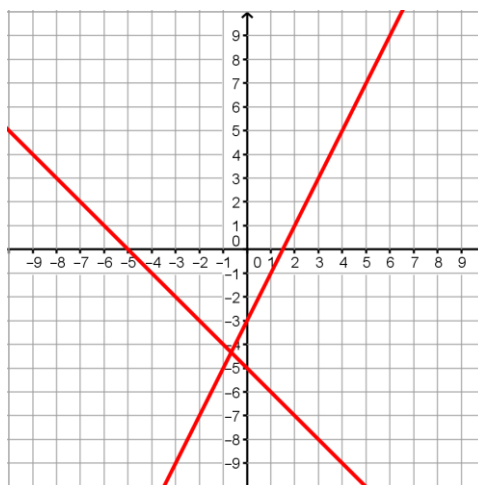6. $\begin{cases} -4y + 8x = 16 \\ 3y + 21x = 15 \end{cases}$

(1, −2)

7 $\begin{cases} x + 2y = -1 \\ 3x + 5y = -1 \end{cases}$

$(3, -2)$

8 $\begin{cases} y = 2x - 3 \\ x + y = -5 \end{cases}$
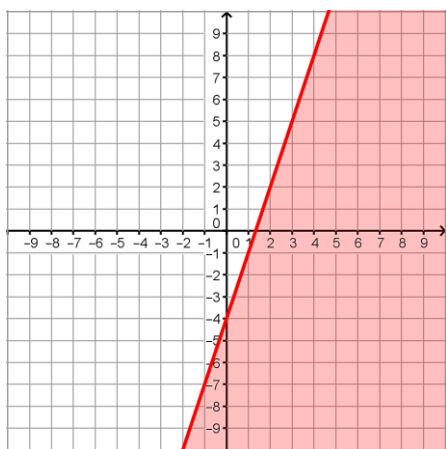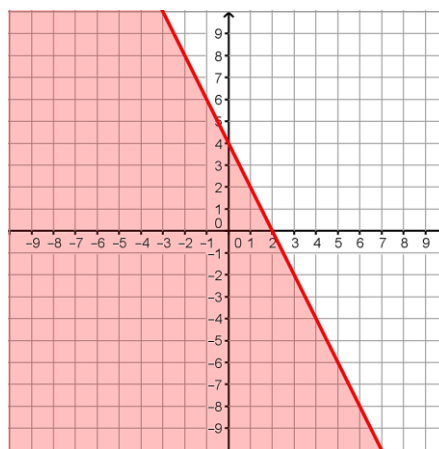
$\left(-\dfrac{2}{3}, -\dfrac{13}{3}\right)$

Go
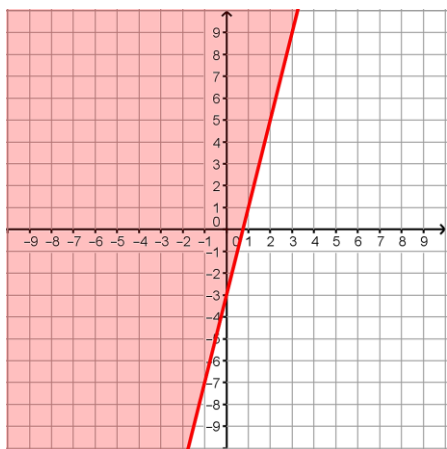Topic: Graph two variable inequalities

Graph the following inequalities.

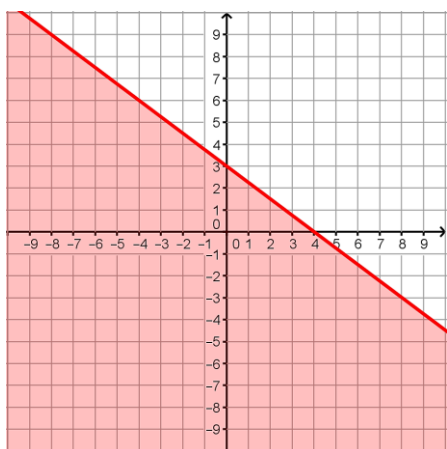| 9. $y \le 3x - 4$	10. $y \le -2x + 4$

11. $y \geq 4x - 3$
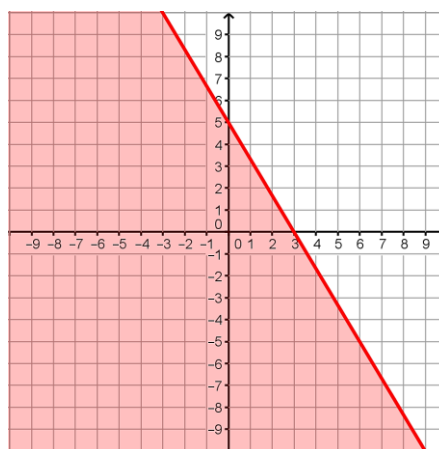
12. $3x + 4y < 12$
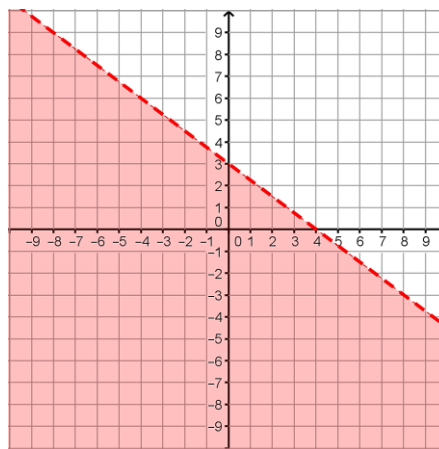
13. $6x + 8y \leq 24$

14. $5x + 3y \leq 15$

Name: **Systems** | **2.6**

Ready, Set, Go!

Ready
Topic: Exponents

Write the following in exponential notation.

1. $4 \times 4 \times 4 \times 4 \times 4$

   $\mathbf{4^5}$

2. $3x \cdot 3x \cdot 3x \cdot 3x$

   $\mathbf{(3x)^4}$

Find each value.

3. 3^3

   $\mathbf{27}$

4. $(-2)^5$

   $\mathbf{-32}$

5. -2^4

   $\mathbf{-16}$

6. $\left(\frac{1}{2}\right)^3$

   $\mathbf{\frac{1}{8}}$

7. $\left(\frac{2}{3}\right)^4$

   $\mathbf{\frac{16}{81}}$

Write the following expression three different ways (one way can include the simplified value).

8. $(2^3)(4)$

   $\mathbf{2 \times 2 \times 2 \times 4}$
   $\mathbf{4 \times 2 \times 4}$
   $\mathbf{8 \times 4}$
   $\mathbf{32}$

9. $(3^3)(2^3)$

   $\mathbf{3 \times 3 \times 3 \times 2 \times 2 \times 2}$
   $\mathbf{27 \times 2 \times 2 \times 2}$
   $\mathbf{3 \times 3 \times 3 \times 8}$
   $\mathbf{216}$

Set
Topic: Solving systems

10. Nadia and Peter visit the candy store. Nadia buys three candy bars and four fruit roll-ups for $2.84. Peter also buys three candy bars, but can only afford one additional fruit roll-up. His purchase costs $1.79. What is the cost of a candy bar and a fruit roll-up individually?

    $\mathbf{3c + 4f = 2.84}$
    $\mathbf{3c + f = 1.79}$

    Candy bar costs $.48 each and a fruit roll-up costs $.35 each

11. A farmer noticed that his chickens were loose and were running around with the cows in the cow pen. He quickly counted 100 heads and 270 legs. How many chickens did he have and how many cows?

x=chickens
y=cows

$x + y = 100$
$2x + 4y = 270$

There were 35 cows and 65 chickens.

12. Solve the system of equations created by one of the following combinations of "Pet Sitters" constraints using the **elimination of variables** method.
    a. Space and Feeding Time
    b. Space and Pampering Time
    c. Start-up Costs and Feeding Time
    d. Start-up Costs and Pampering Time

    a. **approximately 25.7 cats and 8.6 dogs**
    b. **approximately 16.4 cats and 10.9 dogs**
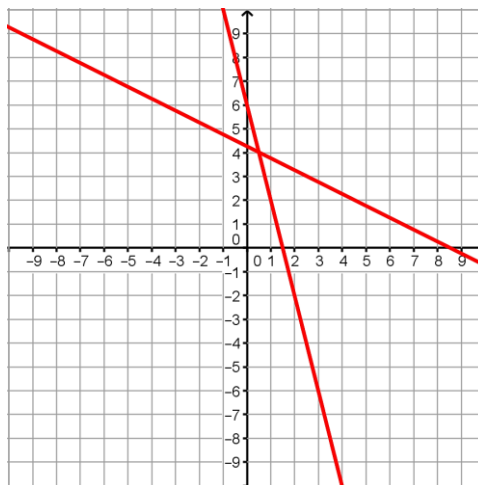   c. **40 cats and 0 dogs**
    d. **20 cats and 8 dogs**

Topic: Solve systems of equations

Solve the following systems of equations using *elimination* of variables, then justify graphically.
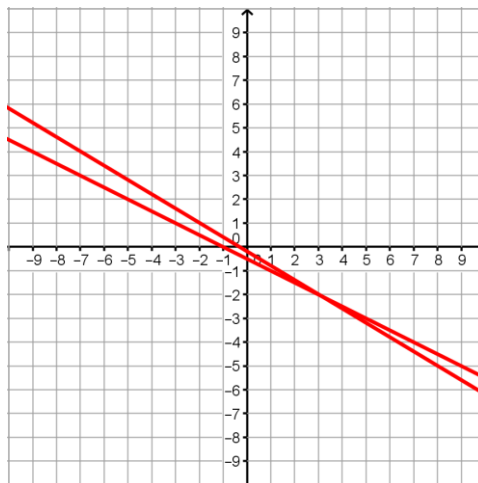
13. $\begin{cases} 2x + 0.5y = 3 \\ x + 2y = 8.5 \end{cases}$

$\left(\frac{1}{2}, 4\right)$

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

$(3, -2)$

Go
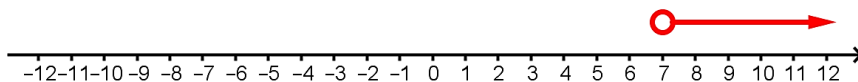
Topic: Solve one variable inequalities.

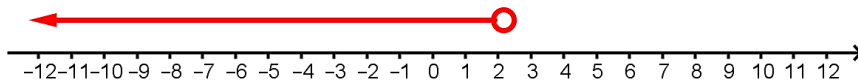**Solve the following inequalities. Graph the solution set on a number line.**
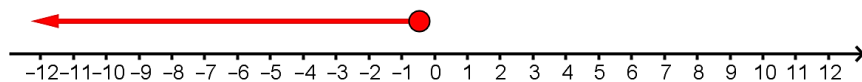
15. $2x + 6 > 55 - 5x$

$x > 7$

16. $2\left(\frac{x}{4} + 3\right) > 6(x - 1)$

$x < \frac{24}{11}$

17. $9x + 4 \leq -2\left(x + \frac{1}{2}\right)$

$x \leq -\frac{5}{11}$

Solve each inequality. Give the solution in *inequality notation*.

18. $-\frac{x}{3} > -\frac{10}{9}$

$x < \frac{10}{3}$

19. $5x > 8x + 27$

$x < -9$

20. $2x < 7x - 36$

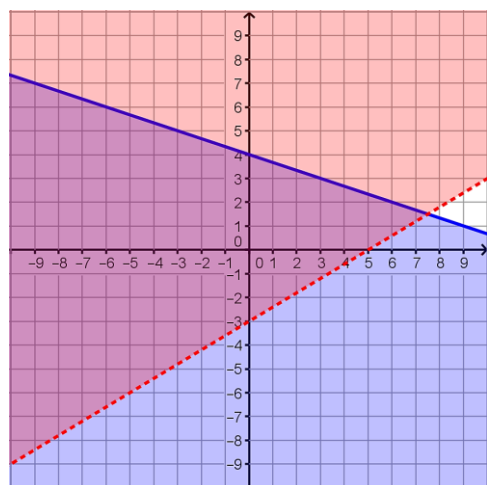$x > \frac{36}{5}$

21. $3x - 7 \geq 3(x - 7)$

$-7 \geq -21$
Infinitely many solutions
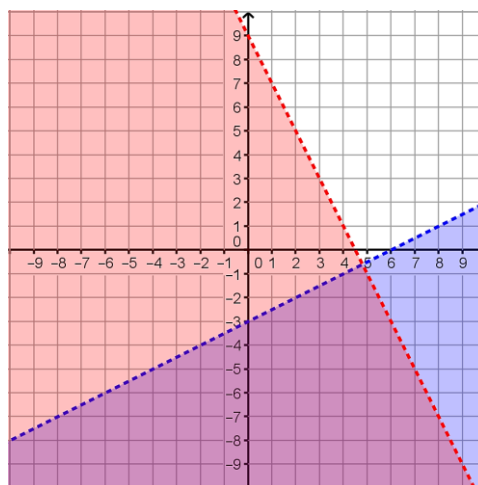
Topic: Graphing systems of inequalities

Graph each system of inequalities. Be sure to darken in the solution set.

22. $2x + 6y \leq 24$
    $3x - 5y < 15$

23. $4x - 8y > 24$
    $4x + 2y < 18$

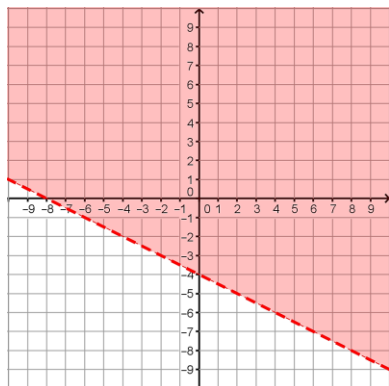# Name: Systems | 2.7

Set, Go!
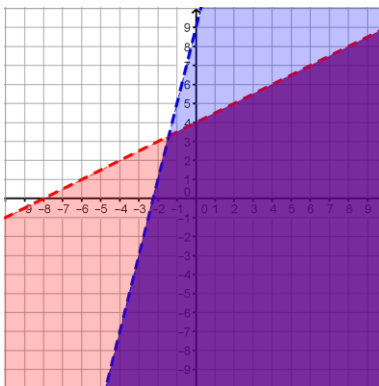
Set
Topic: Writing equations of two variable inequalities

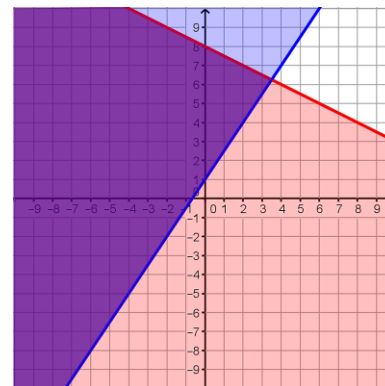**Given the graph with the regions that are shaded write the inequality or system of inequalities.**

1.

$$y > -\frac{1}{2}x - 4$$

2.

$$y < \frac{1}{2}x + 4$$
$$y < 4x + 9$$

3.

$$y \le -\frac{1}{2}x + 8$$
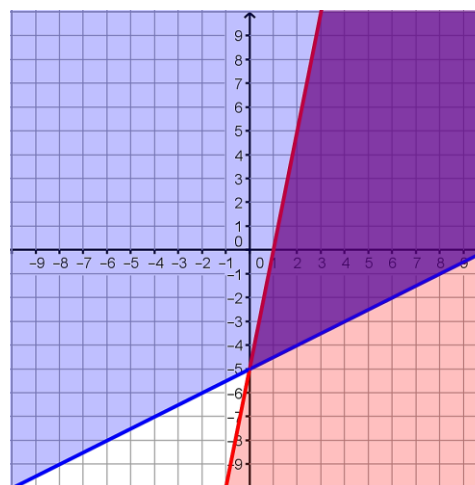$$y \ge \frac{3}{2}x + 1$$

Go
Topic: Graph two variable inequalities

Graph each set of inequalities below. Include the shaded region of both, plus indicate the region that is true for all inequalities.

4. $\begin{cases} x - y < -6 \\ 2y \ge 3x + 18 \end{cases}$
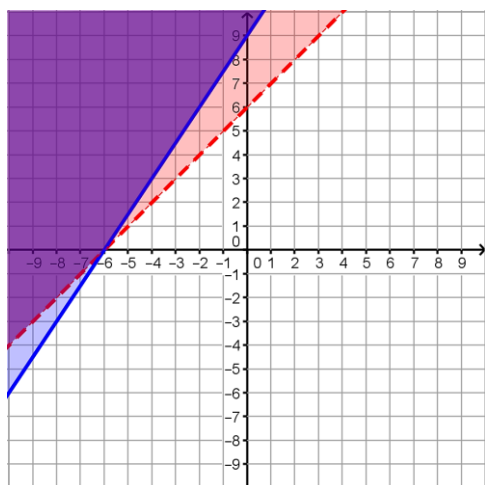
5. $\begin{cases} 5x - y \ge 5 \\ 2y - x \ge -10 \end{cases}$

Solve the following systems of equations.

6. $\begin{cases} 5x - 10y = 15 \\ 3x - 2y = 3 \end{cases}$
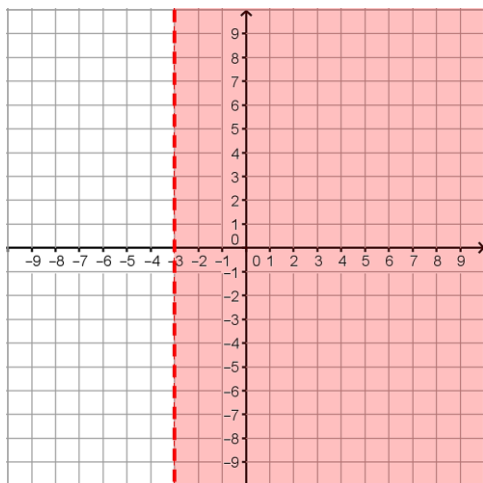
7. $\begin{cases} 5x - 7y = 10 \\ 3x - 2y = -1 \end{cases}$
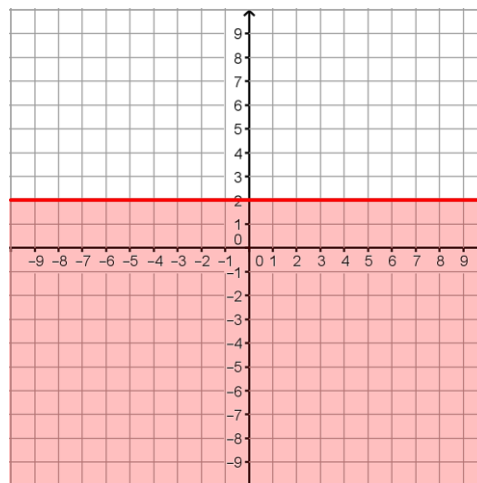
$\left(0, -\dfrac{3}{2}\right)$

$\left(-\dfrac{27}{11}, -\dfrac{35}{11}\right)$

Graph each inequality on the coordinate plane provided.

8. $x > -3$

9. $y \leq 2$

Name: **Systems** | **2.8**

Set, Go!

Set
Topic: Determine the number of solutions in a system of equations

Express each equation in slope-intercept form. *Without solving*, **state whether the system of equations has zero, one, or infinite solutions. Justify your response.**

1. $\begin{cases} 3x - 4y = 13 \\ y = -3x - 7 \end{cases}$

$y = \frac{3}{4}x - \frac{13}{4}$

$y = -3x - 7$

One solution because their slopes are different and the lines are not parallel.

2. $\begin{cases} 3x - 3y = 3 \\ y = -3x - 7 \end{cases}$

$y = x - 1$

$y = -3x - 7$

One solution because their slopes are different and the lines are not parallel.

3. $\begin{cases} 0.5x - y = 30 \\ 0.5x - y = -30 \end{cases}$

$y = \frac{1}{2}x - 30$

$y = \frac{1}{2}x + 30$

No solution because their slopes are the same and the lines are parallel.

4. $\begin{cases} 4x - 2y = -2 \\ 3x + 2y = -12 \end{cases}$
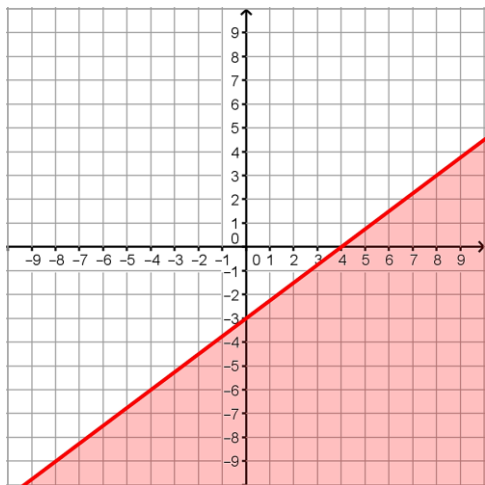
$y = 2x + 1$

$y = -\frac{3}{2}x - 6$

One solution because their slopes are different and the lines are not parallel.
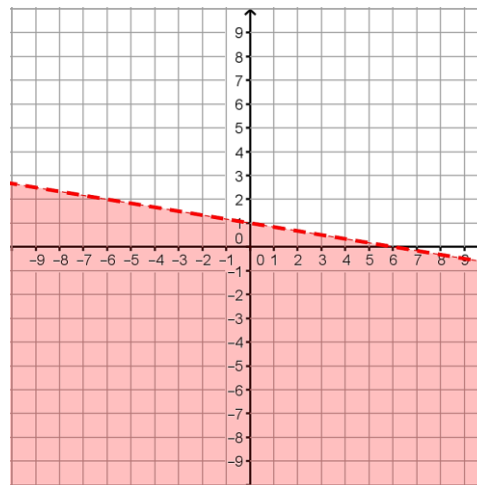
TE-86

Go

Topic: Graph two variable inequalities

Graph the following inequalities. Be sure to label your axes and scale. Justify the region you shade by showing three points in the region as being solutions to the problem. Show a point you have tested to prove your shaded region is accurate.
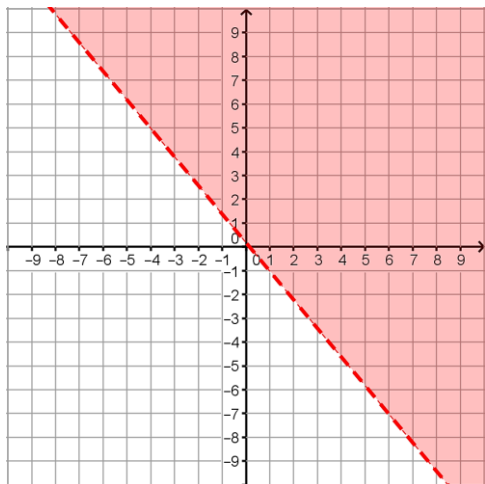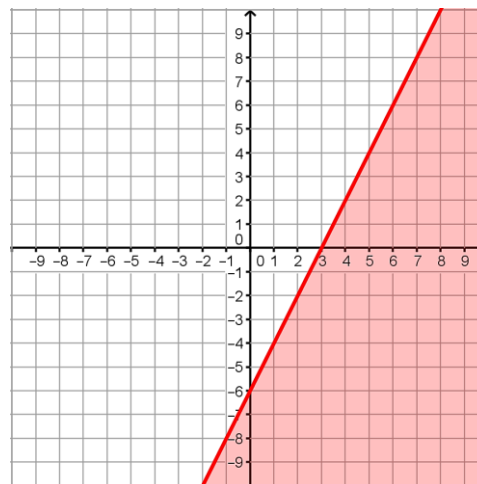
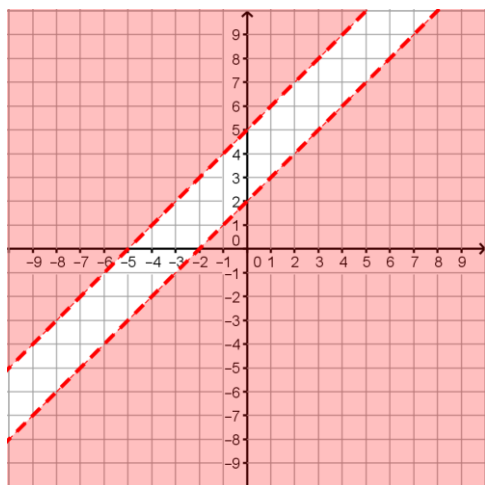| 5. $3x - 4y \geq 12$	6 $x + 6y < 6$
$(0, 0)$ *False*	$(0, 0)$ *True*
7. $6x + 5y > 1$	8. $x - \frac{1}{2}y \geq 3$
$(1, 1)$ *True*	$(0, 0)$ *False*

9. On the same set of axes, graph $y < x + 2$ and $y > x + 5$. What values do these two have in common?
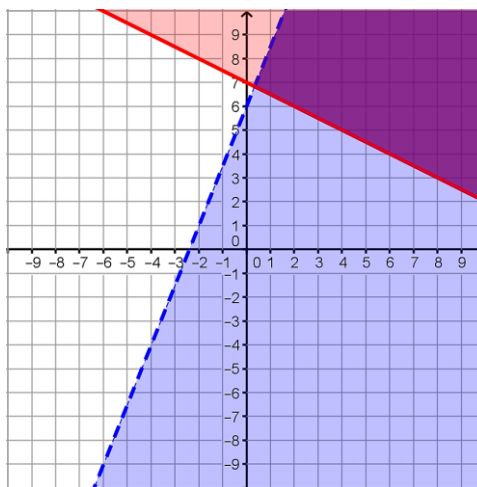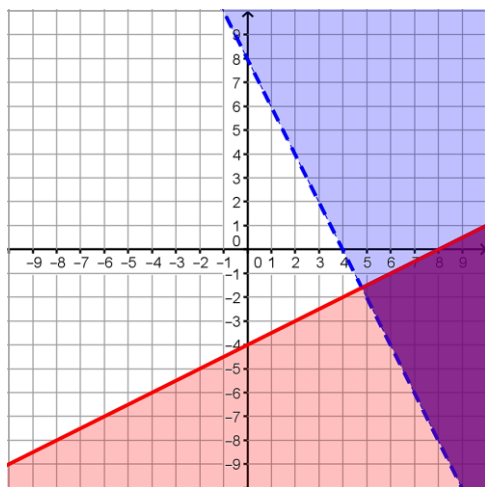

No values in common

Topic: Solving systems of inequalities

Solve each system of inequalities. Be sure to darken the solution set on the graph.

10. $2x + y > 8$
$\quad 3x - 6y \geq 24$

11. $-5x + 2y < 12$
$\quad x + 2y \geq 14$

Name: Systems | 2.9

Ready, Go!

Ready
Topic: Solve exponential equations

Find the value of *x* for each situation.

1. $2^x = 8$
2. $3^x = 27$
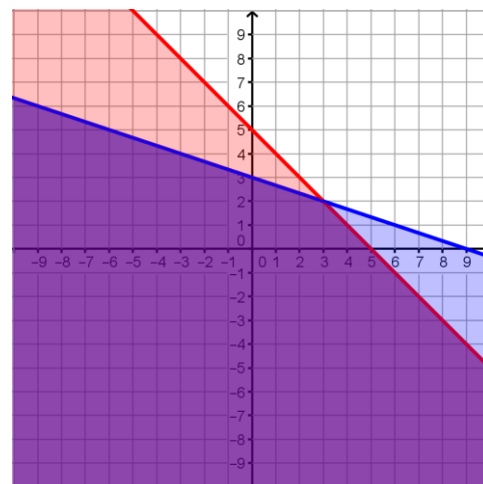3. $2^x = 4$
4. $(-2)^x = -8$

$x = 3$
$x = 3$
$x = 2$
$x = 3$

Go
Topic: Find the solution region of the following systems of inequalities.

5. Write the system of inequalities that is represented in the graph to the right.
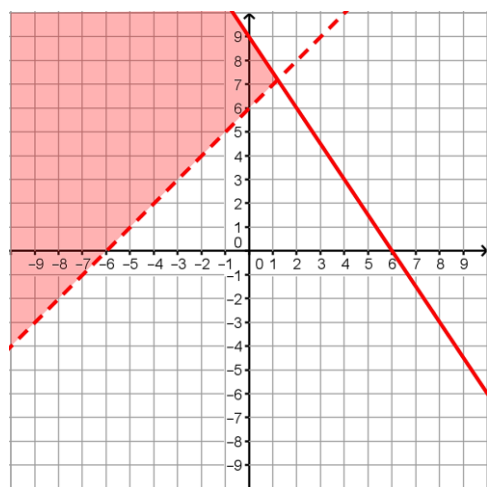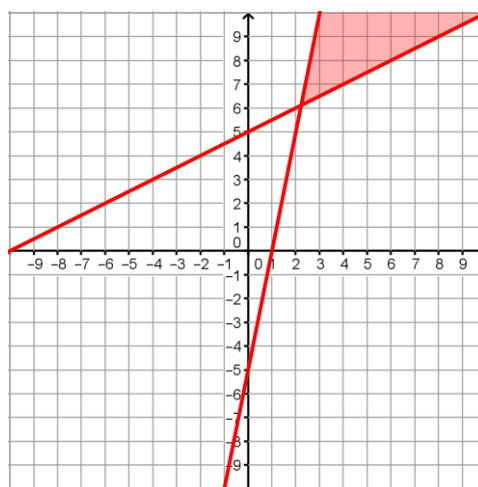
$y \leq -x + 5$
$y \leq -\frac{1}{3}x + 3$

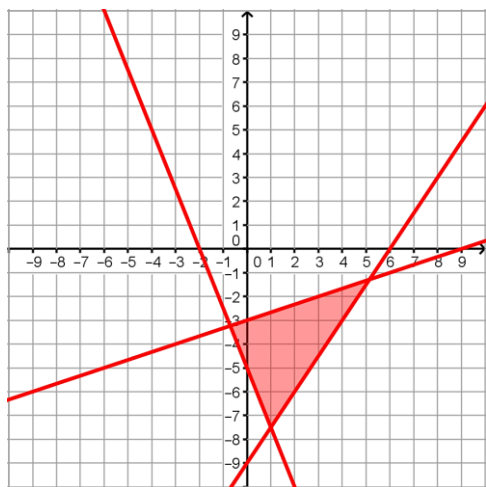**Graph each set of inequalities and determine the solution region.**

6. $\begin{cases} x - y < -6 \\ -2y \geq 3x - 18 \end{cases}$

7. $\begin{cases} 5x - y \geq 5 \\ 2y - x \geq 10 \end{cases}$

8. $\begin{cases} 5x + 2y \geq -10 \\ 3x - 2y \leq 18 \\ 3x - 9y \geq 27 \end{cases}$

9. $\begin{cases} 2x - 3y \leq 24 \\ x + 4y \leq 8 \\ 3x + y \geq -3 \end{cases}$
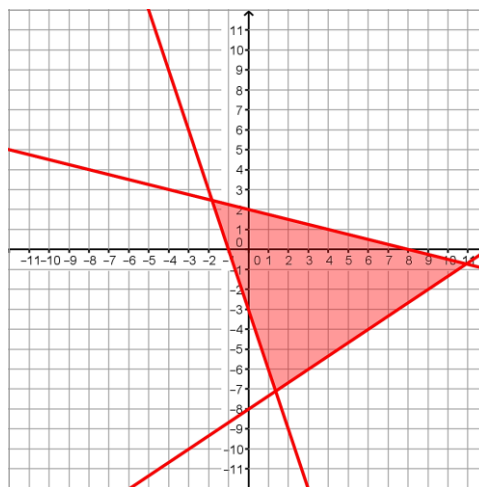
Topic: Solving systems of equations by substitution.

Solve each system using substitution.

10. $-4x + y = 6$
$-5x - y = 21$

$(-3, -6)$

11. $-2x + 6y = 6$
$-7x + 8y = -5$

$(3, 2)$

Topic: Solving systems of equations by elimination.

Solve each system using elimination.

12. $-3x + 7y = -16$
$-9x + 5y = 16$

$(-4, -4)$

13. $3x - 2y = 2$
$5x - 5y = 10$

$(-2, -4)$

Name: **Systems** | **2.10**
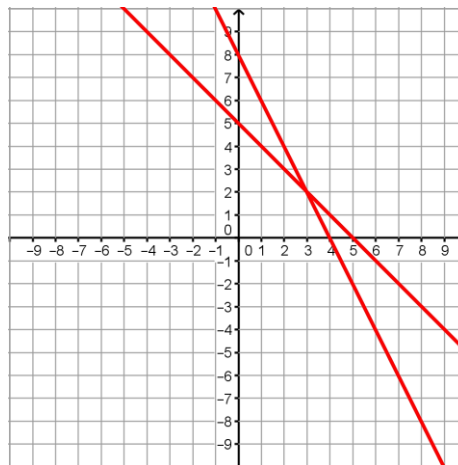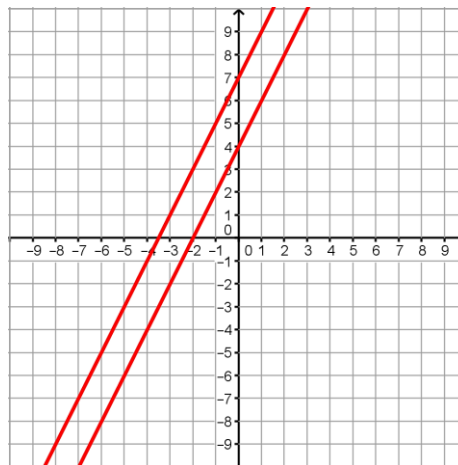
Go!

Go

Topic: Solving systems by graphing

For #1-3, solve each system of equation by graphing:
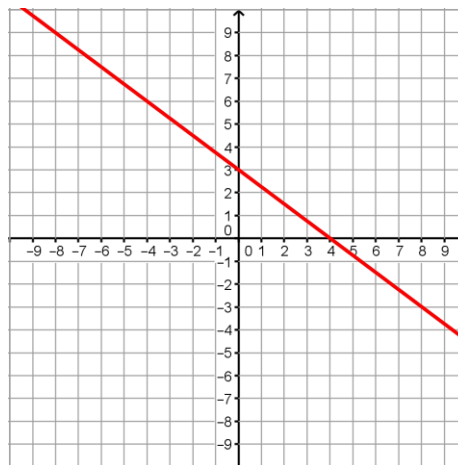
1. $y + x = 5$
    $y = -2x + 8$

    $(\mathbf{3}, \mathbf{2})$

2. $y - 2x = 7$
    $y = 2x + 4$

    No Solution

3. $3x + 4y = 12$
    $y = -\dfrac{3}{4}x + 3$

    Infinitely many solutions

Topic: Solving systems by substitution & elimination

For #4-6, solve each system of equations using the substitution:

4. $y = -x + 15$
   $4x + 3y = 38$

   $(7, 22)$

5. $2x - 3y = 4$
   $x + 4y = -9$

   $(-1, -2)$

6. $y + 2x = 4$
   $6x + 3y = 12$

   Infinitely many solutions

For #7-10, solve each system by elimination:

7. $x - 2y = 7$
   $3x + 2y = 5$

   $(3, -2)$

8. $2x - 8y = 6$
   $x - 4y = 8$

   No Solution

9. $3x + 6y = -6$
   $5x - 2y = 14$

   $(2, -2)$

10. $3x + 5y = 10$
    $5x + 7y = 10$

    $(-5, 5)$

SDUHSD Math 1 College Prep

Topic: Systems of equatiosn word problems

11. When not playing volleyball, the team decided to rent bicycles. They learned that the cost to rent a bike included an initial fee of $25 and an hourly rate of $5 per hour.

Identify the starting point: $(0, 0)$. Identify the slope: __*5*__.

a.   Write an equation that relates the total cost (c) to the number of hours (h).

$c = 5h + 25$

b.   Use your equation to compute the total cost of a 6 hour rental.

$c = \$55$

c.   How would your equation change if the team rented 5 bicycles?

$c = 5(5h + 25) \; or \; c = 25h + 125$

d.   Use your equation in part c to compute the total cost of a 6.5 hour rental.
$c = \$287.50$

12. You work for a small business that sells bicycles, tricycles, and tandem bikes. Bicycles have one seat, two pedals, and two wheels. Tricycles have one seat, two pedals, and three wheels. Tandem bikes have two seats, four pedals, and two wheels.

a.   On Monday you counted 48 tricycle wheels. How many tricycles were in the shop?

16 Tricycles

b.   Write an algebraic equation that shows the relationship between the number of wheels (w) and the number of tricycles (t).

$t = \frac{w}{3}$

c.   On Wednesday there were **no** tandem bikes in the shop. There were only bicycles and tricycles. There are a total of 24 seats and 61 wheels in the shop. How many bicycles and how many tricycles are in the shop? Show how you figured it out using algebra.
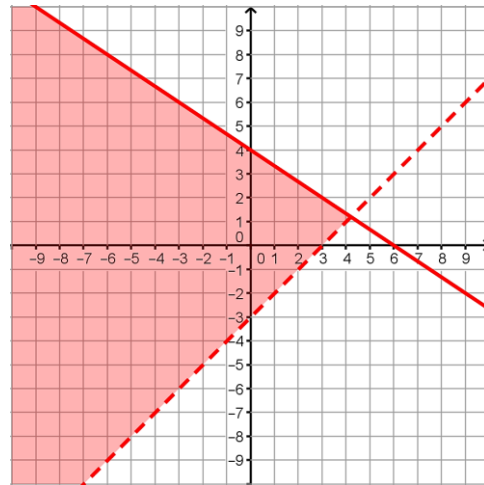
13 Tricycles and 11 Bicycles

Topic: Solving systems of inequalities

For #13-14, solve each system of inequalities.

13. $y \le 2x - 8$
    $y > -\frac{1}{3}x + 4$
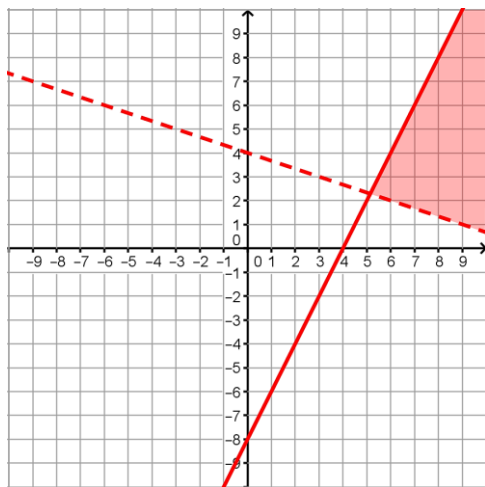
14. $2x + 3y \le 12$
    $y > x - 3$

15. Jason is buying wings and hot dogs for a party. One package of wings costs $7. Hot dogs cost $4 per pound. He must spend less than $40.
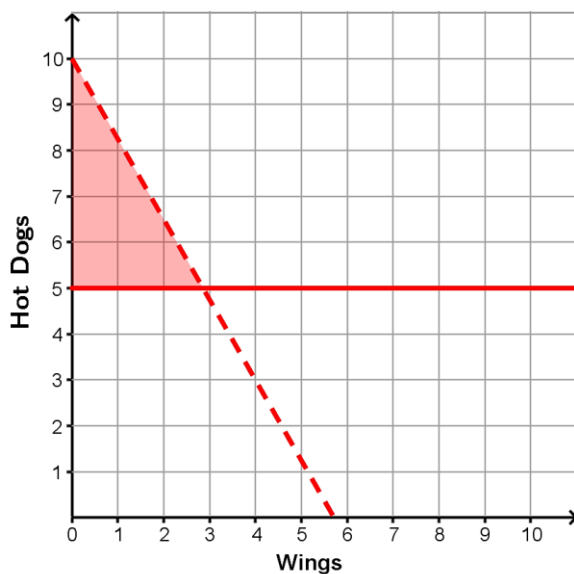   a. Write an inequality to represent the cost of Jason's food for the party.
       $7w + 4h < 40$

    b. Jason knows that he will be buying at least 5 pounds of hot dogs. Write an inequality to represent this situation.
       $h \ge 5$

    c. Graph both inequalities and shade the intersection.

    d. Identify two solutions and justify your answers.

       1 package of wings and 6 pounds of hot dogs $(1, 6)$
       1 package of wings and 7 pounds of hot dogs $(1, 7)$