2.2 Solving Systems of Equations Using the Substitution Method

This method is best used when a variable is already isolated in at least one equation.

Steps:

1. Isolate a variable in one equation.
2. Substitute the expression representing the isolated variable from one equation in place of that variable in the other equation.
3. Find the values for both variables.
4. Check the solution in both equations.

Solve the following systems using the substitution method.

a.
$$h = 3c - 11$$
$$h - 5c = -16$$

b.
$$2w = 3b + 12$$
$$5w + 4b = -39$$

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As a new sales employee you are given two salary structures to choose from. The first option has a base salary of $1200 per month and 7% commission on sales made. The second option has a base salary of $800 per month and 9% commission on sales made.

a. Find equations to represent the two salary options.

b. Find what sales amount will result in the same monthly salary for both options.

When Raja retired she received a $760,000 lump sum retirement package. She wants to invest this amount in two accounts. The first account pays 4% simple interest and the second account pays 7% simple interest. Raja wants to earn $47,500 per year in interest to live on.

a. Write a system of equations that will help Raja find the amount she should invest in each account.

b. . How much should Raja invest in each account to earn the $47,500 she wants each year?

Solve the following systems. Label each system as consistent or inconsistent. If the system is consistent, determine if the lines are independent or dependent.

a. $d = 2.3a + 4.7$

$5d - 11.5a = 23.5$

Solve the following systems. Label each system as consistent or inconsistent. If the system is consistent, determine if the lines are independent or dependent.

b. $m = 5p + 10$

$2m = 10p - 20$

2.3 Solving Systems of Equations Using the Elimination Method

This method is best used when both equations are in the general form or no variable is isolated.

Steps:

1. Multiply one or both equations by a number to make the coefficients of one variable opposite in sign but the same value.
2. Add the two equations together to eliminate the variable, then solve.
3. Find the value for both variables.
4. Check the solution in both equations.

Solve the system using the elimination method.

$7x + 3y = 6$

$4x - 6y = 42$

Yomaira need 70 ml of 45% saline solution for a science experiment. She has some 60% saline solution and some 20% saline solution. How much of each of these solutions should Yomaira combine to get the 70 ml of 45% saline solution she needs?

Solve the system of equations using the elimination method.

$$4a + 9b = 2$$
$$12a + 6b = 48$$

Solve the following systems of equations using the elimination method.

a. $5x - 7y = -4$
$-3x + 9y = 6$

b. $2m - 6n = -4$
$-7m + 21n = 14$

2.6 Solving Systems of Linear Inequalities

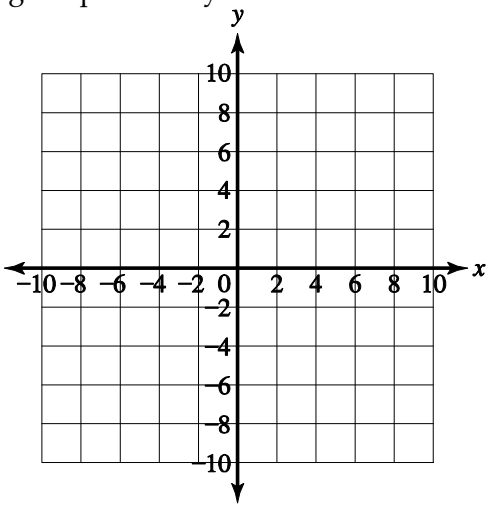
To graph a linear inequality with two variables, graph the line as if it were an equation and shade the side of the line that makes the inequality true. Use a dashed line if the inequality does not include the symbol for equal to.

>	<	Dashed line
≥	≤	Solid line
Shade ABOVE	Shade BELOW	

To solve a system of inequalities, graph all the inequalities on the same set of axes. The region where all the shaded areas overlap is the solution set of the system.

Graph the following inequalities by hand:

a. $y < \frac{1}{3}x - 2$



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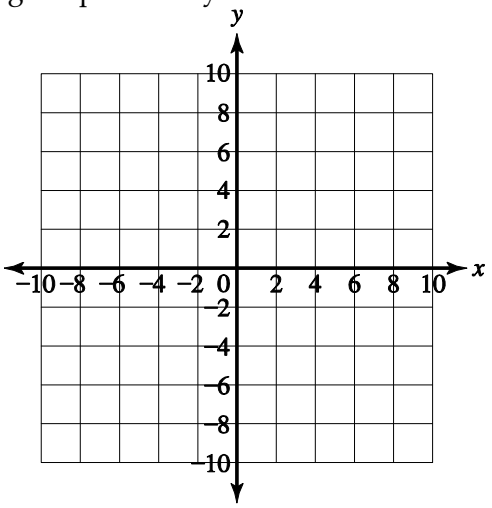
Graph the following inequalities by hand:

b. $y \leq -\frac{2}{3}x + 4$



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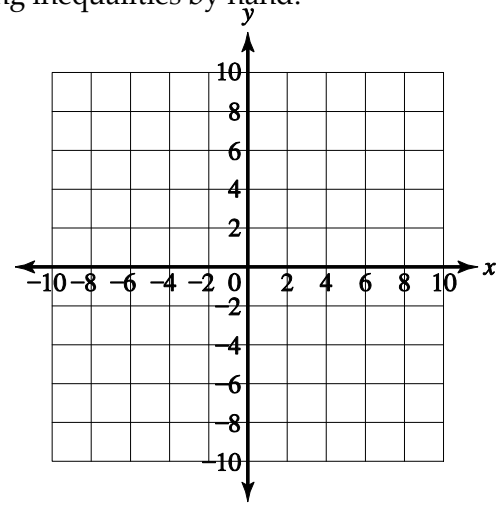
Graph the following inequalities by hand:

c. $2x - y < -5$



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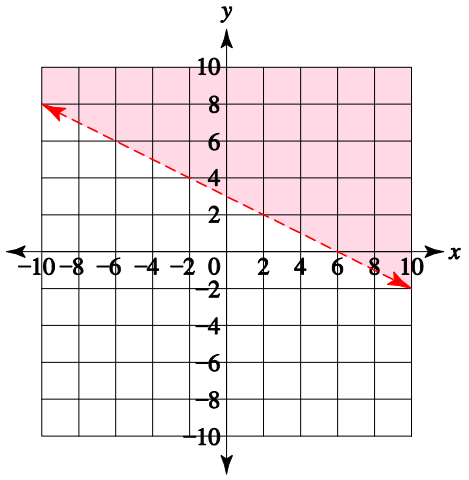
Find the inequality for the given graph.



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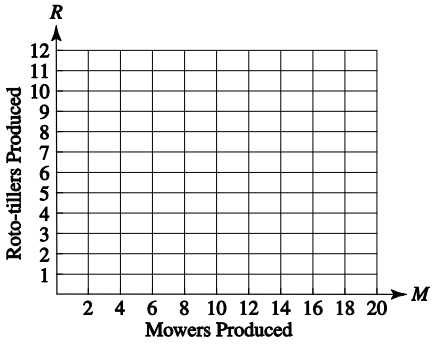
A yard equipment manufacturer produces lawn mowers and roto-tillers in the same plant. Each mower requires 4 hours to produce while roto-tillers require 7 hours to produce. If the plant operates 70 hours per week, what combinations of mowers and roto-tillers can they produce in a week?



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The same plant must stay in production at least 40 hours per week.

a. Create a system of inequalities to model this situation.

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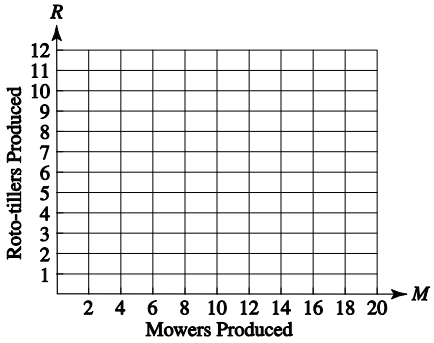
b. Graph the solution set for this system.



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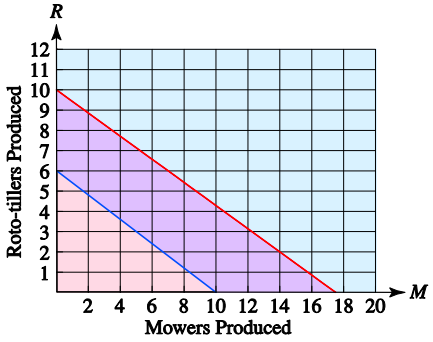
c. Can the plant produce 8 mowers and 4 roto-tillers in a week?

$$4M + 7R \le 70$$

$$4M + 7R \ge 40$$



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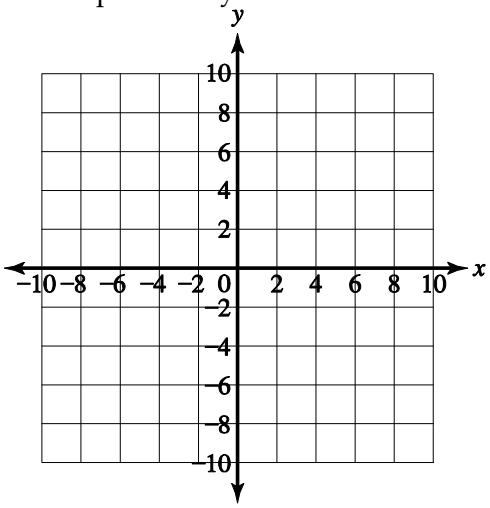
Graph each system of inequalities by hand.

a. $3x - 4y > -12$

$y > -2x - 1$



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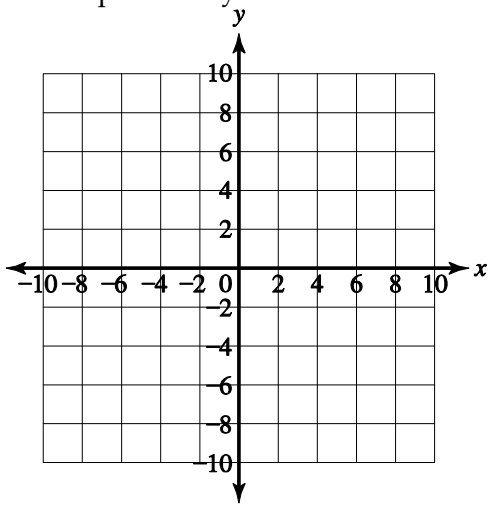
Graph each system of inequalities by hand.

b. $y \geq 1.2x + 2$

$y \leq \frac{6}{5}x - 5$



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Graph the system of inequalities using a graphing calculator.

$y < 3x - 4$

$y > -2x + 1$

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Kian has $400,000 from a court settlement to invest. Kian plans to invest the money into two accounts, one paying 3% simple interest and the other paying 4% simple interest. Kian would like to earn at least $14,300 per year to support himself while going back to college. How much should he invest in each account to earn at least $14,300 per year?

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