

Step 5—Intersection Points and Putting it all Together Steps 1-5

CHAPTERS 1 & 2

Algebraic Methods for Calculating the Intersection Point of Two Lines (Review)

- 14. Comparison Method
- 15. Substitution Method
- 16. Elimination Method

THIS IS STEP 5...only 2 steps left

1. Define the variables.
2. Decide if it is a "Real-Life Situation", if yes, add $x \geq 0, y \geq 0$.
3. Translate the word problem into inequalities. (REMEMBER: "Number Of", "Cost" and "Proportion" Inequalities)
4. Graph the inequalities on a Cartesian Plane to form the polygon of constraints.
5. Find/calculate the vertices (graphically, comparison, substitution, or elimination)

Chapter 1 Comparison Method



Steps for Comparison Method

$$y = y$$

Use when both equations are in function form

1. Make both equations equal to each other.
2. Solve for x
3. Plug in x (in an original equation) and solve for y.
4. Answer: (x, y)

Example:

$$\begin{cases} y = 2x + 3 \\ y = 6x - 5 \end{cases}$$

$$\begin{aligned} 2x + 3 &= 6x - 5 \\ 2x - 6x &= -5 - 3 \\ -4x &= -8 \\ \frac{-4x}{-4} &= \frac{-8}{-4} \\ x &= 2 \end{aligned}$$

$$\begin{aligned} y &= 2x + 3 \\ y &= 2(2) + 3 \\ y &= 4 + 3 \\ y &= 7 \\ (x, y) &= (2, 7) \end{aligned}$$

Classwork/Homework

- MHS Worksheet Chapter 1—"Comparison Method"
#1-10
- Optional—depends on how much you remember
from last year

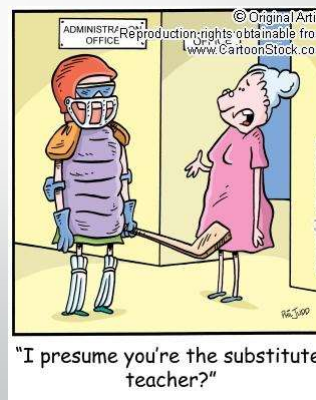
Chapter 1 Substitution Method

Steps for Substitution Method

Use when one equation is in function form (or $x = \dots$), the other is not.

1. Substitute $y =$ or $x =$ in the other equation.
2. Solve for the first variable
3. Then solve for the second variable
4. Answer: (x, y)

Like a substitute teacher, coming in to teach. The substitute replaces the teacher.



Example 1 $\begin{cases} y = 2x + 1 \\ 6x + 2y = 12 \end{cases}$

$$6x + 2(2x + 1) = 12$$

$$6x + 4x + 2 = 12$$

$$10x + 2 = 12$$

$$10x = 12 - 2$$

$$10x = 10$$

$$\frac{10x}{10} = \frac{10}{10}$$

$$x = 1$$

$$y = 2x + 1$$

$$y = 2(1) + 1$$

$$y = 3$$

$$\text{Answer: } (x, y) = (1, 3)$$

Classwork/Homework

- MHS Worksheet—Chapter 1—Substitution Method #1-10
- Optional—depends on how much you remember from last year

Chapter 1 Elimination Method

Steps for Elimination Method

Use when both equations are in general form.

1. Line up equations over one another

(x over x, y over y, number over number)

2. Multiply both equations by a number that makes one of the variables disappear when you add the equations together.

$$4(-3x + 2y = 5)$$

$$3(4x - y = 10)$$



ELIMINATED

Taylor's Trick:

+ (+) + (-)

- (+) - (-)

+ (+) + (-)

+ (-) + (+)

3. Solve for the variable that's left.
4. Plug your answer in to an original equation and solve for the other variable.
5. Answer: (x,y)

Example:

4	3	$(-3x + 2y = 5)$	<u>Taylor's Trick:</u>	$4x - y = 10$
			$+(+)$ $+(-)$	
			$-(+)$ $-(-)$	
			$+(+)$ $+(-)$	$4x - 10 = 10$
			$+(-)$ $+(+)$	$4x = 10 + 10$
$-12x + 8y = 20$				$4x = 20$
				$\frac{4x}{4} = \frac{20}{4}$
				$x = 5$
$12x - 3y = 30$				
		$5y = 50$		
		$\frac{5y}{5} = \frac{50}{5}$		
		$y = 10$		

$(x, y) = (5, 10)$

Classwork/Homework

- MHS Worksheet "Chapter 1—Elimination Method" #1-10
- Optional—depends on how much you remember from last year

Halloween Systems of Equations GAME



- <http://www.math-play.com/system-of-equations-halloween-math-game/system-of-equations-halloween-math-game.html>

Putting it all together— Summary

STEPS 1-5

STEPS 1-5 LINEAR PROGRAMMING

1. Define the variables.
2. Decide if it is a "Real-Life Situation", if yes, add $x \geq 0, y \geq 0$.
3. Translate the word problem into inequalities. (REMEMBER: "Number Of", "Cost" and "Proportion" Inequalities)
4. Graph the inequalities on a Cartesian Plane to form the polygon of constraints.
5. Find/calculate the vertices (graphically, comparison, substitution, or elimination)

On weekends, Andy does some babysitting to earn pocket money. He charges \$4/h in the daytime and \$5/h at night. Next month, Andy expects to be able to babysit for a maximum of 12h during the day and a maximum of 10h at night. He hopes to earn a minimum of \$60.

Let x = number of daytime hours

Let y = number of nighttime hours

Step 1
 $x \geq 0$

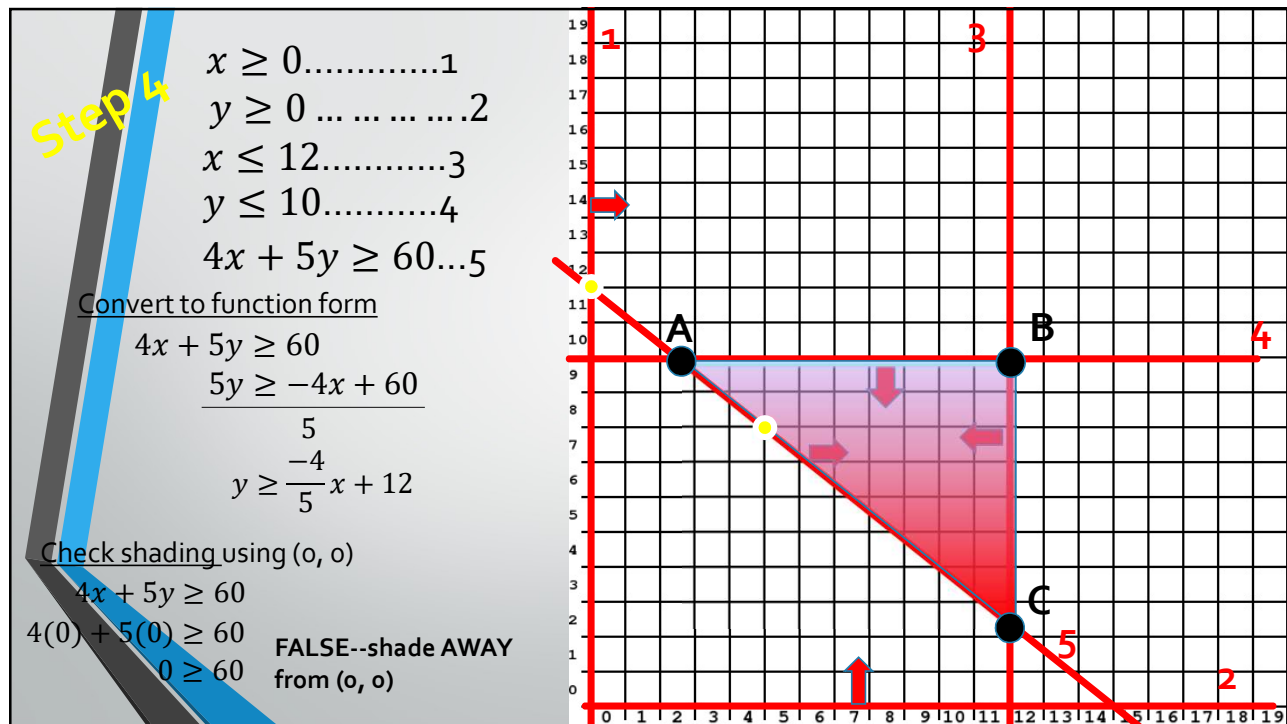
Step 2
 $y \geq 0$

Step 3
 $x \leq 12$

$y \leq 10$

$4x + 5y \geq 60$

System of Inequalities




Step 5

substitution

Point A (4 & 5)

$$\begin{aligned} y &= 10 \\ 4x + 5y &= 60 \\ 4x + 5y &= 60 \\ 4x + 5(10) &= 60 \\ 4x + 50 &= 60 \\ 4x &= 60 - 50 \\ 4x &= 10 \\ \frac{4x}{4} &= \frac{10}{4} \\ x &= \frac{10}{4} \end{aligned}$$

$(x, y) = \left(\frac{10}{4}, 10\right)$



Point B (3 & 4)

graphically $\left\{ \begin{array}{l} x = 12 \\ y = 10 \end{array} \right.$

$(x, y) = (12, 10)$

Point C (3 & 5)

substitution $\left\{ \begin{array}{l} x = 12 \\ 4x + 5y = 60 \end{array} \right.$

$4x + 5y = 60$

$4(12) + 5y = 60$

$48 + 5y = 60$


$5y = 60 - 48$

$5y = 12$

$\frac{5y}{5} = \frac{12}{5}$

$y = \frac{12}{5}$

$(x, y) = (12, \frac{12}{5})$



Classwork/Homework

- None for this section, it is just to give you an idea how it all fits together, we have two more steps left before we start doing full word problems.