

Welcome Back MYP Math 9!

Self-Assess.

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
Monday Date: <u>9/25</u> Topic: <u>19B: Substitution</u>	0 1 <u>2</u>	I did two from #1 and two from #2... great algebra review!
Tuesday Date: <u>9/26</u> Topic: <u>19A/19B Graphing & Substitution Worksheet</u>	0 1 2	
Wednesday Date: _____ Topic: _____	0 1 2	
Thursday Date: _____ Topic: _____	0 1 2	
Friday Date: _____ Topic: _____	0 1 2	

Solving by Elimination 9/26

Warm-up:

In our lives, what does it mean to *eliminate*?

Class Plan

1. Warm-up

2. Which method is best?

19A Graphing, 19B Substitution,
19C Elimination

3. 19C Elimination

4. Practice

Which Method is Best?

(To solve the system of equations)

1) _____ 2) _____

$$y = 2x - 8$$

$$y = 5x - 14$$

$$y = 2x - 5$$

$$-x - 4y = 2$$

3) _____

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

$$x + 6y = 8$$

Which Method is Best?

Based on form

Gradient Intercept Form: $y = mx + c$

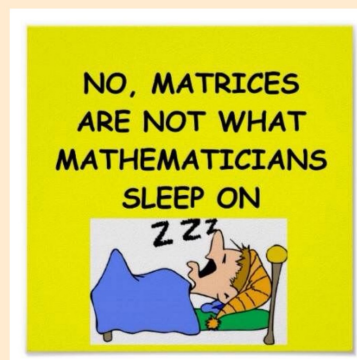
General Form: $Ax + By = C$

$$y = 2x - 8$$
$$y = 5x - 14$$

$$y = 2x - 5$$
$$-x - 4y = 2$$

$$4x + 7y = -2$$
$$x + 6y = 8$$

Joke
Break :)



C**SOLUTION BY ELIMINATION**

If both equations are presented in the general form $Ax + By = C$, then solution by substitution is tedious. We instead use the method of **elimination**.

In this method, we make the coefficients of x (or y) the **same size** but **opposite in sign**. We then add the equations, which has the effect of **eliminating** one of the variables.

When?

- 2 Equations in $Ax + By = C$ Form

How?

- Make coefficient of x or y same size, opp. sign.
- **We add the equations.**

Understanding Elimination Method

Why can we add the equations??

$$\begin{array}{r} 4x + 3y = 2 \\ x - 3y = 8 \end{array}$$

Solve simultaneously by elimination:

Example 4

Solve simultaneously by elimination:

$$4x + 3y = 2$$

$$x - 3y = 8$$

What happens when we add the two equations together?

By adding the equations, we eliminate y .

**Example 4**

Solve simultaneously by elimination:

$$4x + 3y = 2$$

$$x - 3y = 8$$

What happens when we add the two equations together?

$$\frac{5x}{5} = \frac{10}{5}$$

$$x = 2$$

$$4(2) + 3y = 2$$

$$8 + 3y = 2$$

$$\quad -3y \quad -3y$$

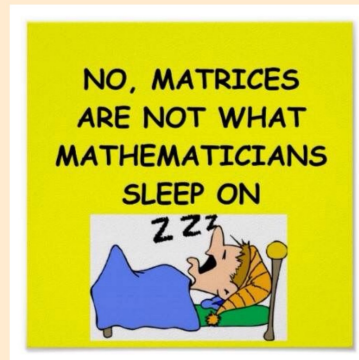
$$\frac{8}{-3} = \frac{2 - 3y}{-3}$$

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

$$y = -2$$

$$(2, -2)$$

Joke Break :)



Example 4 Solution

Solve simultaneously by elimination:
$$\begin{cases} 4x + 3y = 2 \\ x - 3y = 8 \end{cases}$$

The coefficients of y are the same size but opposite in sign.

We **add** the LHSs and the RHSs to get an equation which contains x only.

$$4x + 3y = 2 \quad \dots (1)$$

$$x - 3y = 8 \quad \dots (2)$$

Adding,
$$\frac{5x}{} = 10$$

 $\therefore x = 2$

Substituting $x = 2$ into (1) gives $4(2) + 3y = 2$
 $\therefore 8 + 3y = 2$
 $\therefore 3y = -6$
 $\therefore y = -2$

The solution is $x = 2, y = -2$.

Check: In (2): $(2) - 3(-2) = 2 + 6 = 8 \quad \checkmark$

By adding the equations,
we **eliminate** y .



Example: Solve simultaneously by elimination:

$$\begin{cases} 2x - 5y = 14 \\ 4x + 5y = -2 \end{cases}$$

$$\frac{6x}{6} = \frac{12}{6}$$

$$x = 2$$

$$(2, -2)$$

$$2(2) - 5y = 14$$

$$4 - 5y = 14$$

$$-5y = 10$$

$$y = -2$$

Exercises... 19C Elimination

C Chapter 19 **SOLUTION BY ELIMINATION**

#1 (a-c) #2 (a-c)

EXERCISE 19C

1 What equation results when the following are added vertically?

a $\begin{cases} 3x + 4y = 6 \\ 8x - 4y = 5 \end{cases}$

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

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

d $\begin{cases} 6x - 11y = 12 \\ 3x + 11y = -6 \end{cases}$

e $\begin{cases} -7x + 2y = 5 \\ 7x - 3y = 6 \end{cases}$

f $\begin{cases} 2x - 3y = -7 \\ -2x - 8y = -4 \end{cases}$

2 Solve simultaneously by elimination:

a $\begin{cases} 5x - y = 4 \\ 2x + y = 10 \end{cases}$

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

c $\begin{cases} -5x - 3y = 14 \\ 5x + 8y = -29 \end{cases}$

d $\begin{cases} 4x + 3y = -11 \\ -4x - 2y = 6 \end{cases}$

e $\begin{cases} 2x - 5y = 14 \\ 4x + 5y = -2 \end{cases}$

f $\begin{cases} -6x - y = 23 \\ 6x + 5y = -13 \end{cases}$

EXERCISE 19C

1 What equation results when the following are added vertically?

a $3x + 4y = 6$
 $8x - 4y = 5$

b $2x - y = 7$
 $-2x + 5y = 5$

c $7x - 3y = 2$
 $2x + 3y = 7$

d $6x - 11y = 12$
 $3x + 11y = -6$

e $-7x + 2y = 5$
 $7x - 3y = 6$

f $2x - 3y = -7$
 $-2x - 8y = -4$

Section 19C: #1, #2 (choose 2), #4 or #5 (choose 2), #6

2 Solve simultaneously by elimination:

a $\begin{cases} 5x - y = 4 \\ 2x + y = 10 \end{cases}$

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

c $\begin{cases} -5x - 3y = 14 \\ 5x + 8y = -29 \end{cases}$

d $\begin{cases} 4x + 3y = -11 \\ -4x - 2y = 6 \end{cases}$

e $\begin{cases} 2x - 5y = 14 \\ 4x + 5y = -2 \end{cases}$

f $\begin{cases} -6x - y = 23 \\ 6x + 5y = -13 \end{cases}$

C

Chapter 19

SOLUTION BY ELIMINATION

4 Solve simultaneously by elimination:

a $\begin{cases} 2x + y = 8 \\ x - 3y = 11 \end{cases}$

b $\begin{cases} 3x + 2y = 7 \\ x + 3y = 7 \end{cases}$

c $\begin{cases} 5x - 2y = 17 \\ 3x - y = 9 \end{cases}$

d $\begin{cases} 2x + 5y = -14 \\ -6x + 2y = -9 \end{cases}$

e $\begin{cases} 7x + 3y = 5 \\ 5x - 6y = 9 \end{cases}$

f $\begin{cases} 4x + 9y = 24 \\ 12x - 7y = -30 \end{cases}$

5 Solve simultaneously by elimination:

a $\begin{cases} 2x + 3y = 13 \\ 3x + 2y = 17 \end{cases}$

b $\begin{cases} 4x - 3y = 1 \\ 2x + 5y = 7 \end{cases}$

c $\begin{cases} 2x + 5y = 14 \\ 5x - 3y + 27 = 0 \end{cases}$

d $\begin{cases} 7x + 2y = 20 \\ 13x + 3y = 34 \end{cases}$

e $\begin{cases} 3x + 7y = 5 \\ 5x + 11y = 10 \end{cases}$

f $\begin{cases} 5x - 7y - 9 = 0 \\ 4x - 5y - 5 = 0 \end{cases}$

6 Try to solve by elimination:

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

b $\begin{cases} 3x + 4y = 6 \\ 6x + 8y = 7 \end{cases}$

Comment on your results.

C

Chapter 19

SOLUTION BY ELIMINATION

Solutions

EXERCISE 19C

1 a $11x = 11$ b $4y = 12$ c $9x = 9$ d $9x = 6$
 e $-y = 11$ f $-11y = -11$

2 a $x = 2, y = 6$ b $x = 1, y = -2$
 c $x = -1, y = -3$ d $x = 1, y = -5$
 e $x = 2, y = -2$ f $x = -\frac{17}{4}, y = \frac{5}{2}$

3 a $10x + 25y = 5$ b $-3x + y = -4$
 c $3x - 21y = 24$ d $-10x - 8y = -18$
 e $-18x - 12y = 12$ f $-16x + 8y = -12$

4 a $x = 5, y = -2$ b $x = 1, y = 2$
 c $x = 1, y = -6$ d $x = \frac{1}{2}, y = -3$
 e $x = 1, y = -\frac{2}{3}$ f $x = -\frac{3}{4}, y = 3$

5 a $x = 5, y = 1$ b $x = 1, y = 1$
 c $x = -3, y = 4$ d $x = \frac{8}{5}, y = \frac{22}{5}$
 e $x = \frac{15}{2}, y = -\frac{5}{2}$ f $x = -\frac{10}{3}, y = -\frac{11}{3}$

6 a infinitely many solutions, the lines are coincident
 b no solutions, the lines are parallel