MGSE8.EE.a, b & c

The student will be able to:

solve systems of equations using elimination with addition and subtraction.

Solving Systems of Equations

- So far, we have solved systems using graphing and substitution. These notes show how to solve the system algebraically using ELIMINATION with addition and subtraction.
- Elimination is easiest when the equations are in standard form.

Solving a system of equations by elimination using addition and subtraction.

Step 1: Put the equations in Standard Form.	Standard Form: Ax + By = C
Step 2: Determine which variable to eliminate.	Look for variables that have the Opposite coefficients.
Step 3: Add or subtract the equations.	Combine the parts that are left & Solve for the variable.
Step 4: Plug back in to find the other variable.	Substitute the value of the variable into the equation.
Step 5: Check your solution.	Substitute your ordered pair into BOTH equations.

1) Solve the system using elimination.

$$x + y = 5$$

$$3x - y = 7$$

Step 1: Put the equations in Standard Form.

They already are!

Step 2: Determine which variable to eliminate.

The y's have the Opposite coefficients.

Step 3: Add or subtract the equations.

Combine the equations.

$$\begin{array}{r} x + y = 5 \\ (+)\ 3x - y = 7 \\ \hline 4x \quad = 12 \end{array}$$

$$x = 3$$

1) Solve the system using elimination.

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

Step 4: Plug back in to find the other variable.

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

Step 5: Check your solution.

(3, 2)
$(3) + (2) = 5$ ✓
$3(3) - (2) = 7$ ✓

The solution is (3, 2). What do you think the answer would be if you solved using substitution?

2) Solve the system using elimination.

$$4x + y = 7$$

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

Step 1: Put the equations in Standard Form.

They already are!

Step 2: Determine which variable to eliminate.

The x's have the same Coefficient – take a negative through.

Step 3: Add or subtract the equations.

Combine the Equations.

$$4x + y = 7$$
$$(-)\ 4x - 2y = -2$$
$$3y = 9$$
$$y = 3$$

Remember to "keep-change-change"

2) Solve the system using elimination.

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

Step 4: Plug back in to find the other variable.

$$4x + y = 7$$
$$4x + (3) = 7$$
$$4x = 4$$
$$x = 1$$

Step 5: Check your solution.

(1, 3)

$4(1) + (3) = 7$ ✓

$4(1) - 2(3) = -2$ ✓

Which step would eliminate a variable?

$3x + y = 4$

$3x + 4y = 6$

1. Isolate y in the first equation
2. Add the equations
3. ✓ Subtract the equations
4. Multiply the first equation by -4

Solve using elimination.

$$2x - 3y = -2$$
$$x + 3y = 17$$

1. (2, 2)
2. (9, 3)
3. (4, 5)
4. ✓ (5, 4)

3) Solve the system using elimination.

$$y = 7 - 2x$$

$$4x + y = 5$$

Step 1: Put the equations in Standard Form.

$2x + y = 7$
$4x + y = 5$

Step 2: Determine which variable to eliminate.

The y's have the same Coefficient – take a negative through.

Step 3: Add or subtract the equations.

Combine the Equations.

$$2x + y = 7$$
$$(-)\ 4x + y = 5$$
$$-2x = 2$$
$$x = -1$$

2) Solve the system using elimination.

$$y = 7 - 2x$$
$$4x + y = 5$$

Step 4: Plug back in to find the other variable.

$y = 7 - 2x$
$y = 7 - 2(-1)$
$y = 9$

Step 5: Check your solution.

(-1, 9)
$(9) = 7 - 2(-1)$ ✓
$4(-1) + (9) = 5$ ✓

What is the first step when solving with elimination?

1. Add or subtract the equations.
2. Plug numbers into the equation.
3. Solve for a variable.
4. Check your answer.
5. Determine which variable to eliminate.
6. Put the equations in standard form.

Find two numbers whose sum is 18 and whose difference 22.

1. 14 and 4
2. 20 and -2
3. 24 and -6
4. 30 and 8