Name: _____

Period: _____

An **algebraic** _____ sets two expressions equal to each other.

▶ An **algebraic equation** consists[1] of at least one _____, possibly one or more _____, possibly one or more _____ (+, −, ×, ÷), and an _____.

Algebraic equation(s)

$59 + y = 62$	$102 = 21x - \frac{3}{11}$	$(9)(7) = 7z$
$x = y$	$26 \div 4b = 2b$	$ma = 707$

☑

Not algebraic equations

$31 + 7 = 38$	x	$(s)(t) \div 8$	25

☒

Check for Understanding

Select one or more algebraic equations. Explain.

A $200y + 7 = 505$

B 5002

C $.9z + (9)(2) \div 3$

D $19m + 2 \div \frac{1}{2} = 7$

"… are algebraic equations because_____"

Check for Understanding

Using your own words, what is an algebraic equation? Explain.

"An algebraic equation is _____.**"**

To _____ an **expression** means to combine[2] all **like terms** until there are no more **like terms** left.

▶ To **simplify** an **expression**, use the **Distributive Property** and combine _____.

Review

	$9x + 5(3 + x)$		$15y + 2(5 - y) + 2$
Distributive Property		Distributive Property	
Combine Like Terms		Combine Like Terms	

	$2(a + 5) + 4(a - 2)$		$10t^2 - 7(t^2 + 2) - 5$
Distributive Property		Distributive Property	
Combine Like Terms		Combine Like Terms	

Not simplified expressions

▸ $50b + 18 - 10b$ ▸ $7 - z + 18$ ▸ $m^2 - 11 + 9$

Check for Understanding

In your own words, how do you simplify an expression?

"To simplify an expression _____.**"**

Definition
[1] contains or has
[2] put together

To **simplify** an **expression** means to combine₁ all _____ until there are no more **like terms** left.

▶ To **simplify** an **expression**, use the _____ **Property** and combine **like terms**.

💬 **Check for Understanding**

Which are the simplified expressions? Explain.

"The simplified expressions are… because _____."

A $100y + 22$

B $22z - z + 1$

C $z^2 - 11 + x$

D $4n + 17 - 5n$

E $-77b$

F $10 - 88q + 1$

💬 **Check for Understanding**

Which are the simplified expressions? Explain.

"The simplified expressions are… because _____."

A $7 - 88r + 1$

B $y^2 - 11 + x$

C $44b - b + 1$

D $- b$

E $4n + 17 - 5n$

F $9y + 1$

💬 **Check for Understanding**

Simplify the expressions. Explain.

"To simplify the expression, _____."

A $3 + 17w - 1$

B $27b - b + 1$

C $9y^2 - 2(y^2 + 2)$

"There's supposed to be a fine line between a guess and an educated guess."

"Add the numbers, divide by how many numbers you've added and there you have it-the average amount of minutes you sleep in class each day."

AVERAGE
MEDIAN

AVOID
NEGATIVITY
$f(x) = |x|$

2

Reteach

Show that $(-1, 1)$ is the solution to the system of equations:

$(-1, 1)$

$x = \_\_\_$
$y = \_\_\_$

Remember the Concept

A solution of a system is an ORDERED PAIR that makes BOTH equations true.
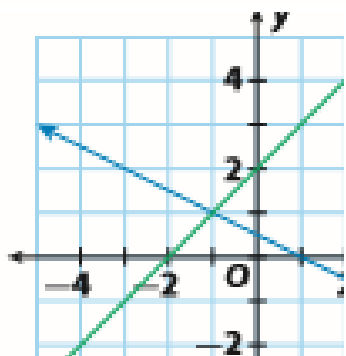
$$2y + x = 1$$
$$y - 2 = x$$

$$2y + x = 1$$

$$y - 2 = x$$

Make the Connection

Students, you already know that the solutions makes both equations true. Now, we will find the solution ordered pair using substitution.

The _____ **method** solves a system by substituting one equation into the other equation.

The substitution method is ideal when a system has one equation with an isolated variable term.

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

NOT Ideal for the substitution method

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

Why not?

_____

Check for Understanding

Which of the following systems of linear equations is ideal for the substitution method? How do you know?

A $\begin{cases} 4x + y = -8 \\ y = 3x + 1 \end{cases}$

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

The system of linear equations ___ is ideal for the substitution method because _____.

3

Steps

1 Substitute the expression of the isolated variable into the other equation.

CFU How did I/you substitute the equation with the isolated variable into the other equation?

2 Solve for the variable.

(Write ordered pair)

CFU How did I/you solve for the variable?

3 Solve for the remaining ordered pair solution value.

(Write ordered pair)

CFU How did I/you solve for the remaining ordered pair solution value?

1 $\begin{cases} 2y + x = 1 \\ y - 2 = x \end{cases}$ solution (__ , __)

Step 1

Step 2

Step 3

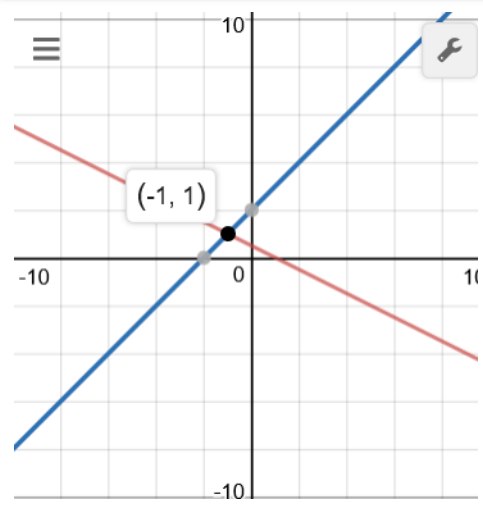2 $\begin{cases} y = 2x - 1 \\ 2x + y = 7 \end{cases}$ solution (__ , __)

Step 1

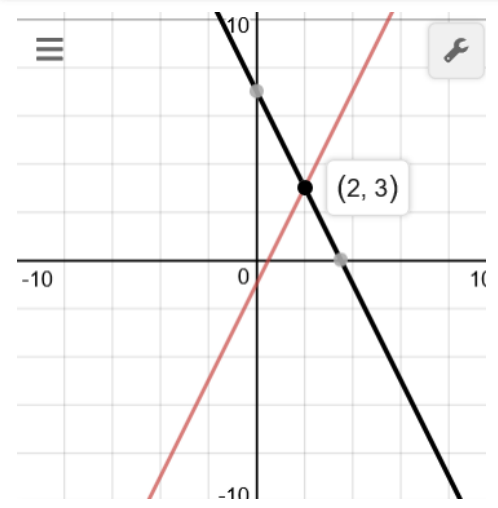Step 2

Step 3

Conceptual Refocusing

1 $\begin{cases} 2y + x = 1 \\ y - 2 = x \end{cases}$ solution (__ , __)

2 $\begin{cases} y = 2x - 1 \\ 2x + y = 7 \end{cases}$ solution (__ , __)

"The solution to the system of linear equation is the ordered pair (_____, _____).

The ordered pair (_____, _____) represents
the intersection of the two graphs
AND
the values that make BOTH equations TRUE."

(-1, 1)

(2, 3)

4

The **substitution method** solves a system by substituting one equation into the other equation.

► The substitution method is ideal when a system has one equation with an _____ variable term.

The substitution method is ideal when a system has any variable with a coefficient of 1.

$$\begin{cases} -7x - 2y = -13 \\ x - 2y = 11 \end{cases}$$

NOT Ideal for the substitution method

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

Check for Understanding

Which of the following systems of linear equations is ideal for the substitution method? How do you know?

A $\begin{cases} 4x + y = -8 \\ 3x + 2y = 4 \end{cases}$

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

The system of linear equations ___ is ideal for the substitution method because ____
_____.

Steps

0 Isolate the 1-coefficient variable to be ready for substitution.

CFU How did I/you set up the equation for the substitution method?

1 Substitute the expression of the isolated variable into the other equation.

CFU How did I/you substitute the equation with the isolated variable into the other equation?

2 Solve for the variable.
(Write ordered pair)

CFU How did I/you solve for the remaining variable?

3 Solve for the remaining ordered pair solution value.
(Write ordered pair)

CFU How did I/you solve for the remaining ordered pair solution value?

3 $\begin{cases} 2x - 3y = -1 \\ 2x + y = -5 \end{cases}$ solution (__ , __)

4 $\begin{cases} x + 3y = 7 \\ 2x + 2y = 10 \end{cases}$ solution (__ , __)

substitution method

1. Solve one of the equations for one of its variables.
2. Substitute the expression from Step 1 into the other equation and solve for the other variable.
3. Substitute the value from Step 2 into either original equation and solve to find the value of the other variable.

ERROR ANALYSIS Describe and correct the error in solving for one of the variables in the linear system $8x + 2y = -12$ and $5x - y = 4$.

X

Step 1 $5x - y = 4$
$-y = -5x + 4$
$y = 5x - 4$

Step 2 $5x - (5x - 4) = 4$
$5x - 5x + 4 = 4$
$4 = 4$

Explain:_____

_____

Fix it.

ERROR ANALYSIS Describe and correct the error in solving for one of the variables in the linear system $4x + 2y = 6$ and $3x + y = 9$.

X

Step 1 $3x + y = 9$
$y = 9 - 3x$

Step 2 $4x + 2(9 - 3x) = 6$
$4x + 18 - 6x = 6$
$-2x = -12$
$x = 6$

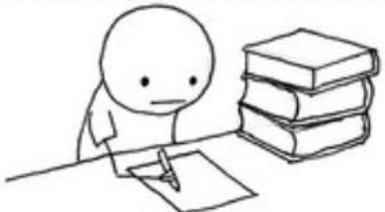Step 3 $3x + y = 9$
$3x + 6 = 9$
$3x = 3$
$x = 1$

Explain:_____

_____

Fix it.

What did you learn today about solving a system of linear equations by substitution?
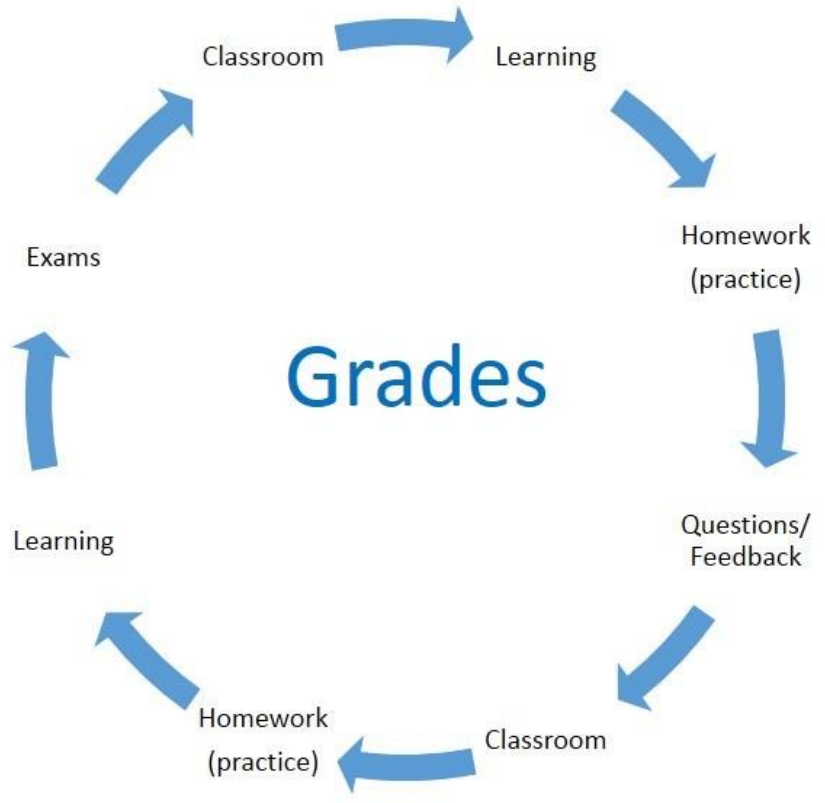
Today, I learned _____

_____

_____.

Word Bank

► Substitution Method
► System of Equations
► Ordered Pair
► Solution

This is Brooke.
Brooke saves all of her homework for Sunday.

Brooke ends up spending all day in the library, only taking breaks for meals.
Brooke isn't smart.
Don't be like Brooke.

Classroom → Learning

Exams

Homework (practice)

Grades

Learning

Questions/ Feedback

Homework (practice) ← Classroom

Steps for Solving a System of Equations by Multiplying First

1. Decide which variable to eliminate.

2. Multiply one or both equations by a constant so that adding or subtracting the equations will eliminate the variable.

3. Solve the system using the elimination method.

4. Substitute the value into either original equation to find the value of the eliminated variable.

Which of the following are possible ways to eliminate a variable by multiplying first?

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

a. Multiply the first equation by 4. _____

b. Multiply the first equation by 5 and the second equation by 2. _____

c. Multiply the first equation by 4 and the second equation by 2. _____

d. Multiply the first equation by 5 and the second equation by 4. _____

e. Multiply the first equation by 2 and the second equation by 5. _____

f. Multiply the second equation by 4. _____

ERROR ANALYSIS Describe and correct the error in solving for one of the variables in the linear system $5x - 7y = 16$ and $x + 7y = 8$.

$$5x - 7y = 16$$
$$\underline{x + 7y = 8}$$
$$4x \qquad = 24$$
$$x = 6$$

Explain: _____

_____

Fix it.

20. **ERROR ANALYSIS** Describe and correct the error in solving for one of the variables in the linear system $4x + 3y = 8$ and $x - 2y = -13$.

$$4x + 3y = 8$$
$$x - 2y = -13 \quad \boxed{\text{Multiply by } -4.}$$

$$4x + 3y = 8$$
$$\underline{-4x + 8y = -13}$$
$$11y = -5$$

$$y = \frac{-5}{11}$$

Explain: _____

_____

Fix it.

8

Explain the Error Liang's solution of a system of linear equations is shown. Explain Liang's error and give the correct solution.

$$\begin{cases} 3x - 2y = 12 \\ -x - 2y = -20 \end{cases}$$

$$3x - 2y = 12$$
$$\underline{-x - 2y = -20}$$
$$2x = -8$$
$$x = -4$$

$$3x - 2y = 12$$
$$3(-4) - 2y = 12$$
$$-12 - 2y = 12$$
$$-2y = 24$$
$$y = -12$$
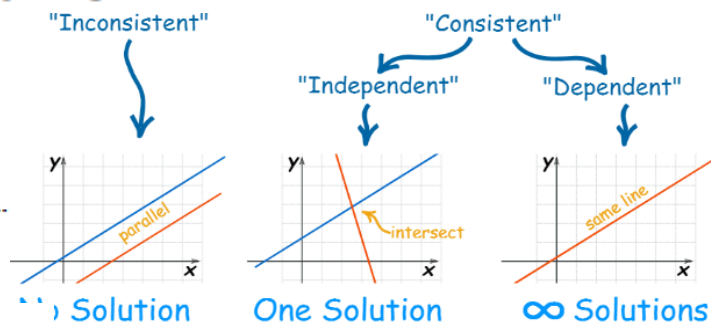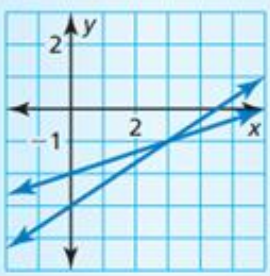
Solution: $(-4, -12)$

Explain:_____

_____

_____.

Fix it.

Solving a System of Linear Equations by Graphing

Step 1 Rewrite the equation in slope-intercept form.
Step 2 Find the slope and the y-intercept.
Step 3 The plot y-intercept.
Step 4 Use the slope to find another point on the line.
Step 5 Repeat steps 1 to 4 to graph the 2nd equation.
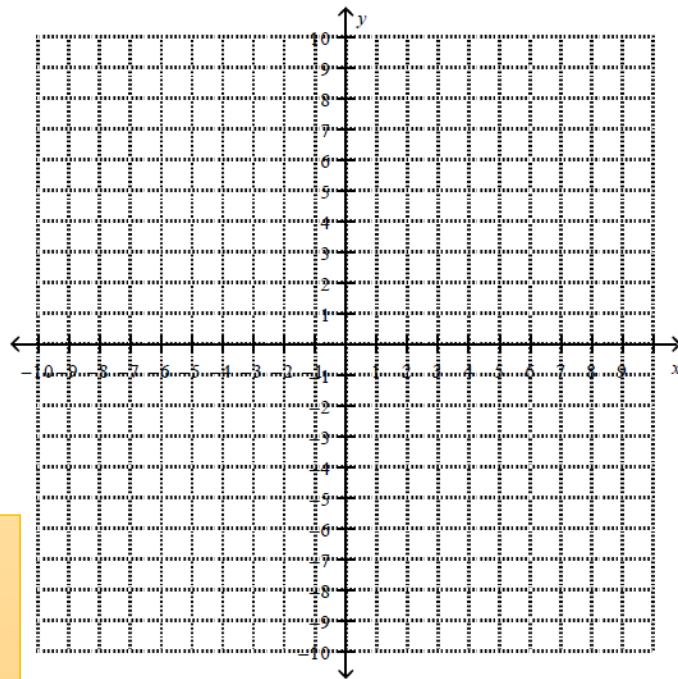**Step 6** Estimate the point of intersection.

"Inconsistent"   "Consistent"

"Independent"   "Dependent"

parallel   intersect   same line

No Solution   One Solution   ∞ Solutions

ERROR ANALYSIS In Exercises 21 and 22, describe and correct the error in solving the system of linear equations.
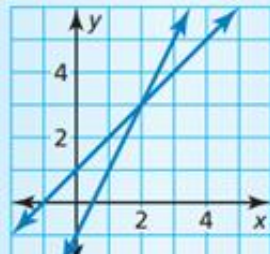
21.

✗

The solution of the linear system
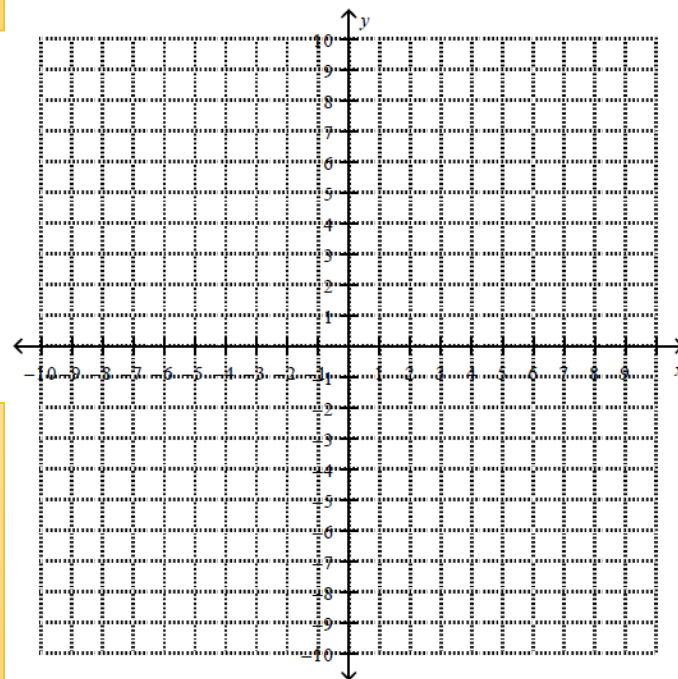$x - 3y = 6$ and
$2x - 3y = 3$
is $(3, -1)$.

Explain:_____ _____

Fix it.

22.

✗

The solution of the linear system
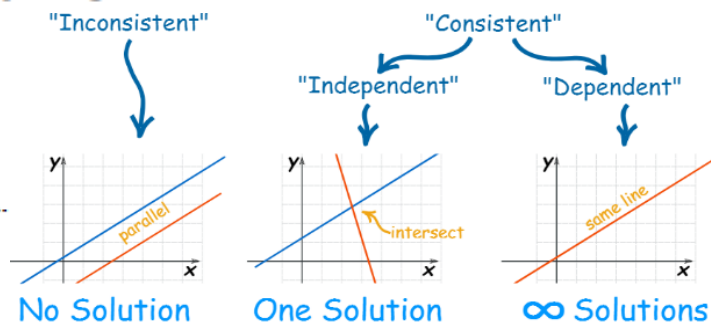$y = 2x - 1$ and
$y = x + 1$
is $x = 2$.

Explain:_____ _____

Fix it.

Solving a System of Linear Equations by Graphing

Step 1 Rewrite the equation in slope-intercept form.
Step 2 Find the slope and the y-intercept.
Step 3 The plot y-intercept.
Step 4 Use the slope to find another point on the line.
Step 5 Repeat steps 1 to 4 to graph the 2nd equation.
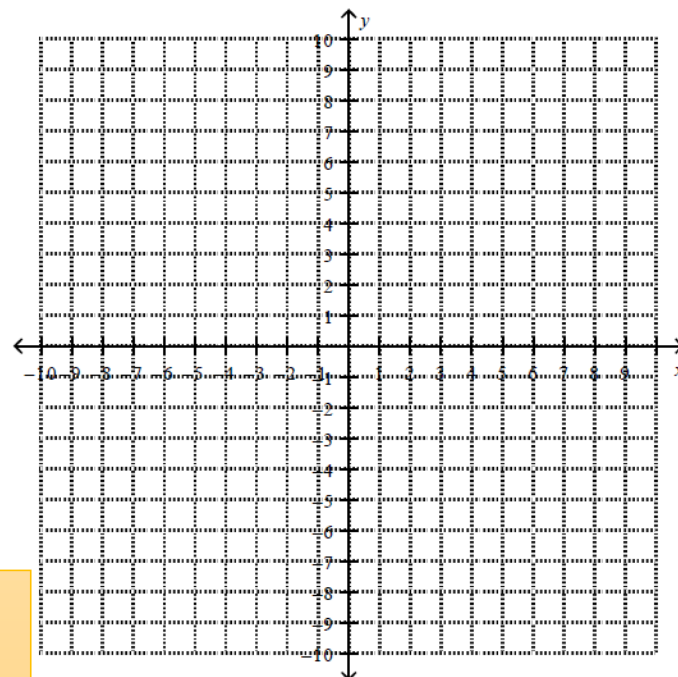**Step 6** Estimate the point of intersection.

"Inconsistent"   "Consistent"

"Independent"   "Dependent"

parallel   intersect   same line

No Solution   One Solution   ∞ Solutions

ERROR ANALYSIS In Exercises 23 and 24, describe and correct the error in solving the system of linear equations.

23.

$-4x + y = 4$
$4x + y = 12$

The lines do not intersect. So, the system has no solution.

Explain:_____ _____

Fix it.

24.

$y = 3x - 8$
$y = 3x - 12$

The lines have the same slope. So, the system has infinitely many solutions.

Explain:_____ _____

Fix it.

11