KCS@home
Summer Edition

Eighth Grade Math

This packet includes four sections that cover the major content of 8th grade math. Each section includes four pages of notes and practice for each topic. For additional support, visit KCS TV on YouTube for instructional videos that accompany each section.

The following content is included in this packet:

	Topic			
	I. Solving Equations and Systems of Equations	**II. The Pythagorean Theorem**	**III. Proportional Relationships and Functions**	**IV. Exponents and Scientific Notation**
Activity 1	Equations with the Distributive Property	The Pythagorean Theorem	Representing Proportional Relationships	Integer Exponents
Activity 2	Solving Systems of Linear Equations by Graphing	Converse of the Pythagorean Theorem	Interpreting the Unit Rate as Slope	Scientific Notation with Positive Powers of 10
Activity 3	Solving Systems by Substitution	Distance Between Two Points	Writing Linear Equations from a Table	Scientific Notation with Negative Powers of 10
Activity 4	Solving Systems by Elimination	Distance Between Two Points 2	Identifying and Representing Functions	Operations with Scientific Notation

Name _____ Date _____ Class _____

Equations with the Distributive Property

When solving an equation, it is important to simplify on both sides of the equal sign before you try to isolate the variable.

$3(x + 4) + 2 = x + 10$
Since you cannot combine x and 4, multiply both by 3 using the Distributive Property.

$3x + 12 + 2 = x + 10$
Then combine like terms.

$3x + 14 = x + 10$
$\underline{-14 \quad\;\; -14}$
Subtract 14 to begin to isolate the variable term.

$3x = x - 4$
$\underline{-x \quad -x}$
Subtract x to get the variables to one side of the equation.

$\dfrac{2x}{2} = \dfrac{-4}{2}$
Divide by 2 to isolate the variable.

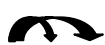$x = -2$
The solution is -2.

Solve.

1. $5(i + 2) - 9 = -17 - i$

2. $-3(n + 2) = n - 22$

_____   _____

You may need to distribute on both sides of the equal sign before simplifying.

$3(3m - 2) = \dfrac{3}{4}(4 - 24m)$
Use the Distributive Property on both sides of the equation to remove the parentheses.

$9m - 6 = 3 - 18m$
$\underline{+6 \quad +6}$
Add 6 to begin to isolate the variable term.

$9m = 9 - 18m$
$\underline{+18m \qquad\;\; +18m}$
Add $18m$ to get the variables to one side of the equation.

$\dfrac{27m}{27} = \dfrac{9}{27}$
Divide by 27 to isolate the variable.

$m = \dfrac{1}{3}$
The solution is $\dfrac{1}{3}$.

Solve.

3. $9(y - 4) = -10\left(y + 2\dfrac{1}{3}\right)$

4. $-7\left(-6 - \dfrac{6}{7}x\right) = 12\left(x - 3\dfrac{1}{2}\right)$

_____   _____

Section 1 Activity 2 | Solving Systems of Linear Equations by Graphing

When solving a system of linear equations by graphing, first write each equation in slope-intercept form. Do this by solving each equation for y.

Solve the following system of equations by graphing.

$y = -2x + 3$
$y + 4x = -1$

The first equation is already solved for y.

Write the second equation in slope-intercept form. Solve for y.
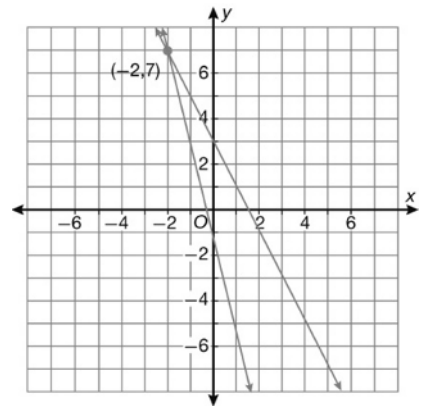
$y + 4x - 4x = -1 - 4x$

$y = -4x - 1$

Graph both equations on the coordinate plane.

The lines intersect at $(-2, 7)$. This is the solution to the system of linear equations.

To check the answer, substitute -2 for x and 7 for y in the original equations.

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

$y + 4x = -1;\ 7 + 4(-2) = -1;\ 7 - 8 = -1;\ -1 = -1$
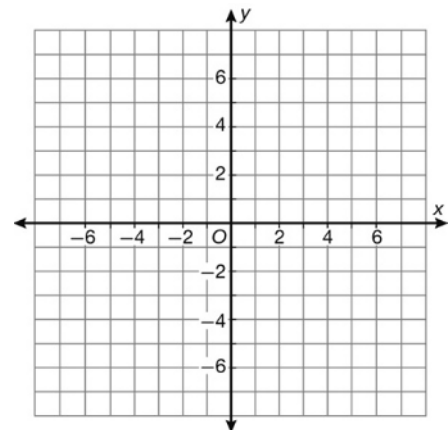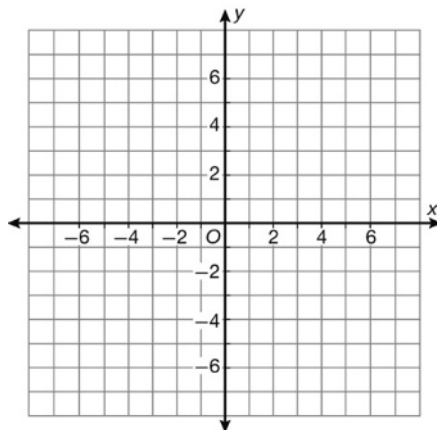

Solve each linear system by graphing. Check your answer.

1. $y = x + 1$
   $y = -x + 5$

2. $y + 3x = 1$
   $y - 6 = 2x$

Section I
Activity 3
Solving Systems by Substitution

You can use substitution to solve a system of equations if one of the
equations is already solved for a variable.

Solve $\begin{cases} y = x + 2 \\ 3x + y = 10 \end{cases}$

Step 1: Choose the equation to use as the
substitute.
Use the first equation $y = x + 2$
because it is already solved for a variable.

Step 2: Solve by substitution.

$$x + 2$$

$$3x + y = 10$$
$$3x + (x + 2) = 10 \quad \textit{Substitute } x + 2 \textit{ for } y.$$
$$4x + 2 = 10 \quad \textit{Combine like terms.}$$
$$\underline{-2 \quad -2}$$
$$4x = 8$$
$$\frac{4x}{4} = \frac{8}{4}$$
$$x = 2$$

Step 3: Now substitute $x = 2$ back into
one of the original equations to
find the value of y.

$$y = x + 2$$
$$y = 2 + 2$$
$$y = 4$$

The solution is (2, 4).

Check:

Substitute (2, 4) into both equations.

$$y = x + 2 \qquad\qquad 3x + y = 10$$
$$4 \overset{?}{=} 2 + 2 \qquad\qquad 3(2) + 4 \overset{?}{=} 10$$
$$4 \overset{?}{=} 4 \checkmark \qquad\qquad 6 + 4 \overset{?}{=} 10$$
$$\qquad\qquad\qquad 10 \overset{?}{=} 10 \checkmark$$

Solve each system by substitution. Check your answer.

1. $\begin{cases} x = y - 1 \\ x + 2y = 8 \end{cases}$

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

_____   _____

3. $\begin{cases} y = x + 5 \\ 3x + y = -11 \end{cases}$

4. $\begin{cases} x = y + 10 \\ x = 2y + 3 \end{cases}$

_____   _____

Section I Activity 4	**Solving Systems by Elimination**

Solving a system of two equations in two unknowns by **elimination** can be done by adding or subtracting one equation from the other.

Elimination by Adding
Solve the system: $x + 4y = 8$
                               $3x - 4y = 8$
Solution
Notice that the terms "$+4y$" and "$-4y$" are opposites. This means that the two equations can be added without changing the signs.

$$\begin{array}{r} x + 4y = 8 \\ \underline{3x - 4y = 8} \\ 4x + \;0 = 16 \\ 4x = 16, \text{ or } x = 4 \end{array}$$

Substitute $x = 4$ in either of the equations to find y: $x + 4y = 8 \longrightarrow 4 + 4y = 8$
                                                                      $4y = 4$, or
                                                                      $y = 1$

The solution of this system is (4, 1).

Elimination by Subtracting
Solve the system: $2x - 5y = 15$
                               $2x + 3y = -9$
Solution
Notice that the terms "$2x$" are common to both equations. However, to eliminate them, it is necessary to *subtract* one equation from the other. This means that the *signs* of one equation will change. Here, the top equation stays the same. The signs of the bottom equation change.

$$\begin{array}{r} 2x - 5y = \;\;\;15 \\ \underline{(-)2x \;(-)3y = (+)9} \\ 0 - 8y = \;\;\;24, \text{ or } y = -3 \end{array}$$

Substitute $y = -3$ in either of the original equations to find x:
$2x - 5y = 15 \longrightarrow 2x - 5(-3) = 15$
                                        $2x + 15 = 15$, or
                                                       $x = 0$

The solution of this system is (0, –3).

Solve the following systems by elimination. State whether addition or subtraction is used to eliminate one of the variables.

1. $3x + 2y = 10$
     $3x - 2y = 14$

   Operation: _____

   Solution: (_____, _____)

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

   Operation: _____
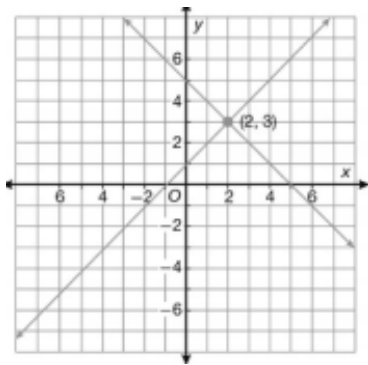
   Solution: (_____, _____)

<u>**Answer Key**</u>

I. Solving Equations and Systems of Equations
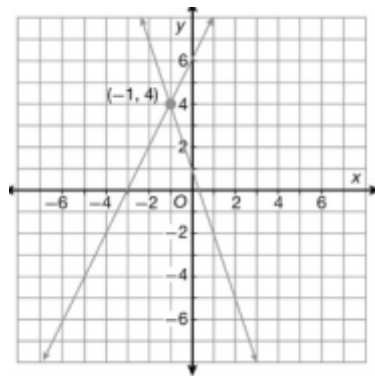
Activity 1: Equations with the Distributive Property

1. i = −3
2. n = 4
3. y = 2/3
4. x = 14

Activity 2: Solving Systems of Linear Equations by Graphing

1. (2,3)

2. (-1,4)

Activity 3: Solving Sy stems by Substitution

1. (2, 3)
2. (7, 9)
3. (−4, 1)
4. (17, 7)

Activity 4: Solving Systems by Elimination

1. Addition; (4, −1)
2. Subtraction; (−6, 18)