

Name _____ Per _____

LO: I can find the values for the solution to a system of equations algebraically.



emath 5.3

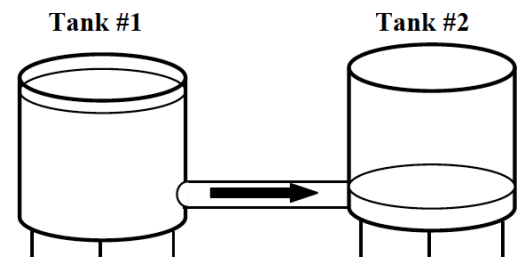
 DO NOW On the back of this packet

 (1) **Solving a system**

SOLUTIONS TO A SYSTEM OF EQUATION

1. A point (x, y) is a **solution** to a system if it makes **all equations true**.
2. The **solution set** of a system is the collection of **all pairs** (x, y) that are solutions to the system (see 1).

3. Water is flowing from Tank #1 to Tank #2 as shown in the picture. Originally, Tank #1 had 1,540 gallons in it and Tank #2 had 236 gallons in it. Water is draining out of Tank #1 at a rate of 6 gallons per minute and, thus, filling Tank #2 up at a rate of 6 gallons per minute.



- (a) Write an equation for each tank that models the volume of water, v in gallons, as a function of the number of minutes, m , that the water has been flowing.

Tank #1: _____

Tank #2: _____

- (b) Find out how long it takes, to the nearest minute, for the two tanks to have the same number of gallons. Will it take longer or shorter than 2 hours? Justify.

□ (2) Solving a System

There is one final way that we will solve systems of equations, but we won't look at that until the next lesson. Systems are important because they tell us **multiple conditions** that relate **multiple variables** or **unknowns**. In this lesson, we will experiment with systems and what we can do with them and how this affects their solutions.

Exercise #1: Consider the system shown to the right and its solution $(1, 5)$.

$$4x + 2y = 14$$

(a) Show that $x = 1$ and $y = 5$ is a solution to the system of equations.

$$x - y = -4$$

(b) Find the sum of the two equations. Is the point $(1, 5)$ a solution to this new equation? Justify your yes/no response.

(c) Multiply both sides of the second equation by 2 to get an equivalent equation. Is the point $(1, 5)$ a solution to this new equation? Justify your yes/no response.

(d) Take the equation you found in (c) and add it to the first equation. What happens? How does this allow us to now solve for the variable x ? Do so, what do you find?

(e) Once you know the value of x , how can you find the value of y ?

(3) **Solutions to Systems**

SOLUTIONS TO SYSTEMS REMAIN SOLUTIONS IF

1. Properties of equality are used to rewrite either of the equations.
2. The equations are added or subtracted or any rewrite is added or subtracted.

Exercise #2: Consider the system shown to the right:

- (a) Show that the point $(3, -1)$ is a solution to the system.

$$4x - 3y = 15$$

$$3x + 2y = 7$$

- (b) The point $(3, -1)$ will be a solution to the system shown below. How can you determine this without substituting the point in?

$$8x - 6y = 30$$

$$9x + 6y = 21$$

- (c) What happens when you add these two equations together? How can this let you solve for x ? Find it and find y .

Exercise #3: Solve the system below using the **method of elimination**. Show the steps in your work and show that your answer is in fact a solution to the system.

$$2x + 4y = 2$$

$$6x + 3y = -3$$

 (4) **Solutions to Systems****APPLICATIONS**

4. A small movie theater sells children's tickets for \$4 each and adult tickets for \$10 each for an animated movie. The theater sells a total of \$388 in ticket sales.
- (a) If c represents the number of children's tickets sold and a represents the number of adult tickets sold, write an equation that models the information shown above.
- (b) Show that $c = 52$ and $a = 18$ is a solution to this equation (not system).
- (c) Show that after multiplying both sides of the equation in (a) by 2, $c = 52$ and $a = 18$ is still a solution to this equation.
- (d) How can you interpret multiplying both sides of the equation by 2 in letter (a) in terms of ticket prices and total ticket sales?

 (5) **Exit Ticket**

ON THE LAST PAGE

 (6) **Homework**NEXT PAGE

(6) **Homework**
cont.

FLUENCY

1. The point $(2, 7)$ is a solution to the system of equations given below.

$$3x + 2y = 20$$

$$x - y = -5$$

- (a) Show that this point is a solution. (b) Add the two equations together and show that $(2, 7)$ is a solution to the result.
- (c) Subtract the two equations (be careful) and show that $(2, 7)$ is a solution to the result. (d) Multiply both sides of the second equation by 2. Show that $(2, 7)$ is a solution to the result.

2. The point $(4, -2)$ is a solution to the system of equations $2x + y = 6$. Which of the following equations would it *not* be a solution to?

$$x + 5y = -6$$

- (1) $3x + 6y = 0$ (3) $2x + 2y = 12$
(2) $2x + 10y = -12$ (4) $x - 4y = 12$

3. Which of the following points is a solution to the system?

- (1) $(4, 1)$ (3) $(-3, 9)$ $x - 2y = -11$
(2) $(5, 2)$ (4) $(3, 7)$ $5x + 2y = 29$
-

Exit Ticket Name _____ Date _____ Per _____

4.1L

(1) The LO (Learning Outcomes) are written below your name on the front of this packet. Demonstrate your achievement of these outcomes by doing the following:

Consider the system of equation: $x + 4y = 13$
 $3x + 2y = 19$

(a) Multiply both sides of the second equation by -2 . What equation results?

(b) Add the equation from (a) to the first equation. What happens? What can you now solve for?

(c) Now that you know the value of x , how can you find the value of y ? Find it.

(d) What could you have multiplied both sides of the first equation by to **eliminate** the x instead of the y ?

DO NOW **Name** _____ **Date** _____ **Per** _____

4.1L

(1) Solving progress: Solve one of the two problems below.

(a) $2(x + 7) - 34 = 4x - 11x + 4(x - 1)$ (b) $14 = \frac{1}{2}(8x + 12)$

(2) Translation to algebra progress. Write an algebraic statement to represent this situation. Be sure to write a "Let" statement to define any variables.

Tim is choosing between two cell phone plans that offer the same amount of free minutes. Cingular's plan charges \$39.99 per month with additional minutes costing \$0.45. Verizon's plan costs \$44.99 with additional minutes at \$0.40. How many additional minutes, a , will it take for the two plans to cost the same?