

A. Lesson Context

BIG PICTURE of this UNIT:	<ul style="list-style-type: none"> • What is meant by the term FUNCTIONS and how do we work with them? • mastery with working with basics & applications of linear functions • mastery with working with basics & applications of linear systems • understanding basics of function concepts and apply them to lines & linear systems 		
CONTEXT of this LESSON:	<p>Where we've been</p> <p>In Lessons 1-4 you have been working with the different forms of linear functions and graphing them by hand and with technology.</p>	<p>Where we are</p> <p>Connecting to Linear Relations, we will not work with linear systems... what they are and how we solve them.</p>	<p>Where we are heading</p> <p>How do we apply the concept of "functions" to linear & exponential relations.</p>

B. Lesson Objectives

Writing equations

Solving systems of equations graphically on desmos and on TI-84.

Solving systems of equations with the substitution method.

C. Fast Five (Skills Review Focus)

- The Bridge Problem: Please watch the video for the bridge problem and see if you can solve it. Use the space below for working out your solution.

The meaning of variables and building Systems of Equations.

1. How can variables give you new information? Suppose Mr. S's class has **b** boys and **g** girls.
 - a. Mr. S noticed that $b + g = 23$. What does that tell you about his class?
 - b. If $b = g - 3$, what statement can you make about the number of boys and the number of girls in the class?
 - c. How many girls are in Mr. S's class? Explain how you got your answer.

2. A local train has 3 passenger cars. When it is sold out, each passenger car holds p people.
 - a. If the train has 8 employees (they are not included in the p passengers) write and **expression** that represents the total number of people on the train.
 - b. When the train is sold out, it has a total of 176 people on it. Write an **equation** that represents this information
 - c. Solve your equation and tell me what this answer means with respect to the problem.

3. A statement that describes what the variable represents is called a "let" statement. It is called this because it often is stated in the form "Let $p = \dots$ ". While solving the problems below, examine how "let" statements are used.
 - a. Let $c =$ the number of students at CAC and let $c - 100 =$ the number of students at BCIS. Which school has more students? How can you tell?
 - b. Based on the let statements in part (a) above, translate this mathematical sentence into English: $c + (c - 100) = 840$.
 - c. A book called HOW I LOVE MATH has only 3 chapters. Let $p =$ the number of pages in Chapter 1, $p + 12 =$ the number of pages in Chapter 2 and $0.5p =$ the number of pages in chapter 3. Which is the longest chapter? Which is the shortest?
 - d. Using the definitions in part c above, write and solve the mathematical sentence that states HOW I LOVE MATH has 182 pages. How many pages are in Chapter 2?

4. Annika and Kate bought some hotdogs and drinks at the local basketball game. Each hotdog costs 4 LE and each drink costs 5 LE. The total for their stuff was 30 LE. Also Kate also knows that the number of Hotdogs was one more than twice the number of drinks. With this information Annika was able to produce the following equations.

- a. Do you agree with her? If you do, explain in detail what each variable means and where this equation comes from.

$$4y + 5x = 30$$

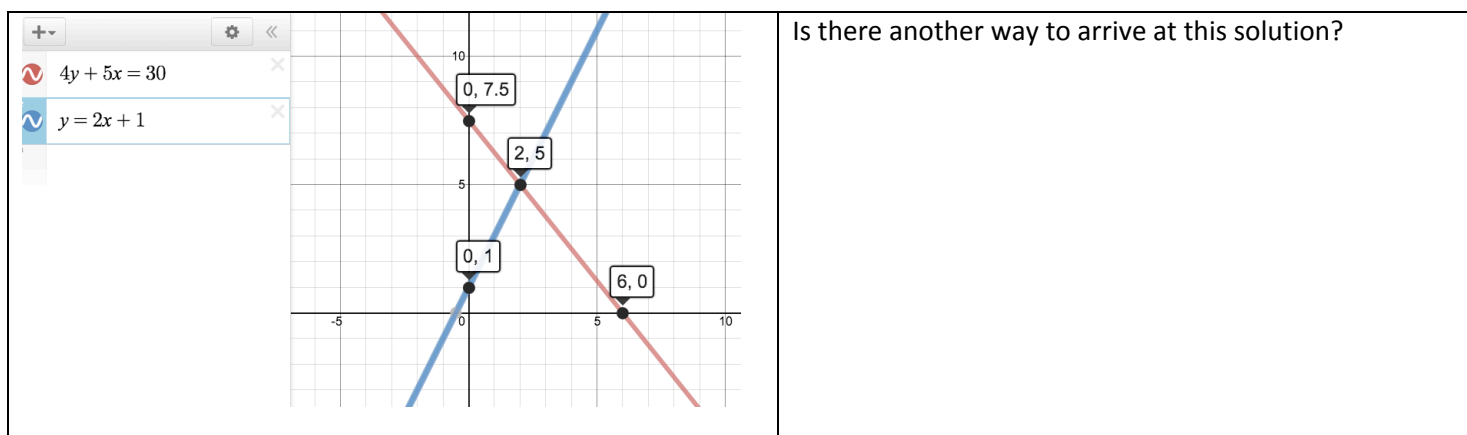
$$y = 2x + 1$$

- b. Why do we call this a “system of equations”?

Annika then graphed these two equations on Desmos and got the following picture.

- c. What is the “solution”?

- d. Why do we call it a solution?



- e. Please explain the meaning of the picture in terms of the context of the problem. Does all of the picture make sense in the context of the problem?

- f. What does the intersection point mean? Why is it important?

Some Practice with Substitution: Please solve the following using the Substitution Method

$$y = 3x$$

$$x - 4 = y$$

$$2y - 5x = 4$$

$$-5y + 8x = 29$$

$$2x + 2y = 18$$

$$c = -b - 11$$

$$x = 3 - y$$

$$3c + 6 = 6b$$

Fabulous Footballers 😊

Mr. S is a big fan of American Football. In a recent game, Mr. S's team scored 70 points. Interesting, the number of field goals was 2 more than three times the number of Touchdowns. Remember that you earn 7 points for a Touchdown and 3 points for a Field Goal.

Which of the following systems best represents the above situation.

$$t = 3f + 2$$

$$f = 3t + 2$$

$$7t + 3f = 70$$

$$3t + 7f = 70$$

$$t = 3f + 2$$

$$f = 3t + 2$$

$$3t + 7f = 70$$

$$3t + 7f = 70$$

Solve the system you selected in part (a) using the substitution method and then interpret what your answer means.

Some Practice with Skills: 8 Minutes: GO!!! Isolate the y term in the following equations:

(i) $2x - y = 7$

(ii) $3x + y = 12$

(iii) $3x - 2y = 6$

(iv) $5x + \frac{1}{2}y - 2 = 0$

g. Isolate the x term in the following equations:

(i) $x - 5y = 7$

(ii) $-3x + y = 12$

(iii) $5x - 2y = 6$

(iv) $0.25x + y - 2 = 0$

h. Simplify and solve the following expressions

(i) $3x + (x-3) = 9$

(ii) $-4y + 3(2y - 5) = 12$

(iii) $2x - (x - 2) = 5$

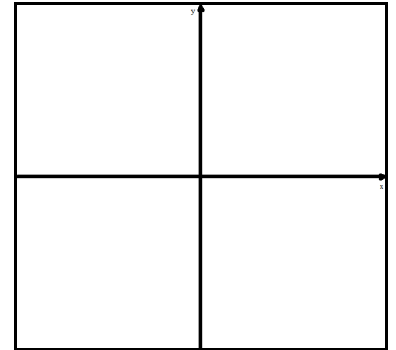
SUBSTITUTION Examples: Solve and verify the following linear systems: DESOMS TECH

(i) $y = 2x - 4$ and $y = -x + 5$

Algebraic Verification:

Graphic Verification: DESOM

Meaning of Solution:

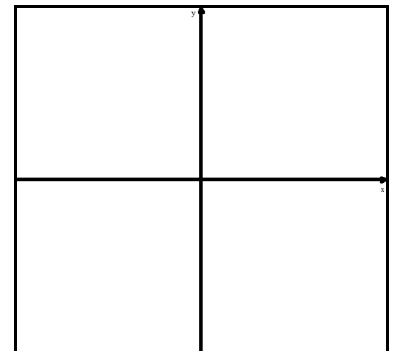


(ii) $2x + 3y - 9 = 0$ and $y = -x - 2$

Algebraic Verification:

Graphic Verification: DESOMOS

Meaning of Solution

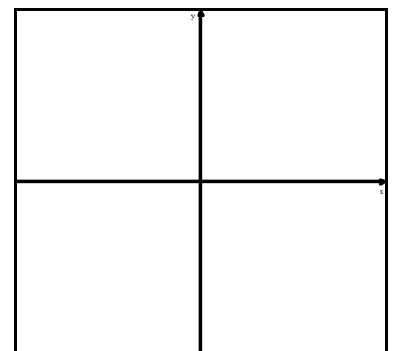


(iii) $y = 5x - 2$ and $6x + 3y = 36$

Algebraic Verification:

Graphic Verification: DESOMS

Meaning of Solution

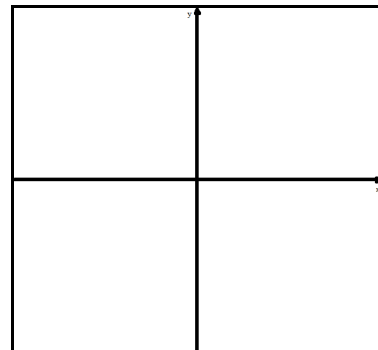


(iv) Solve the system

$$4x + 2y = 10$$
$$3y - 6x = 9$$

Algebraic Verification:

Graphic Verification: DESMOS



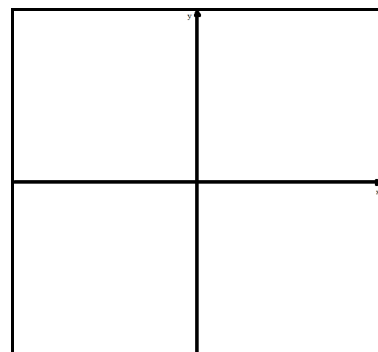
SUBSTITUTION Examples: Solve and verify the following linear systems: TI-84 Tech

(ii)

$$3x - 2y = 17$$
$$-6x - 2y = 8$$

Algebraic Verification:

Graphic Verification:

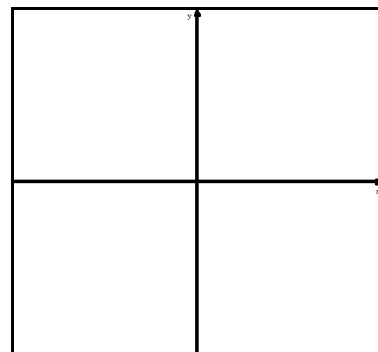


(iii)

$$y + 4x = 9$$
$$3y - 6x = 9$$

Algebraic Verification:

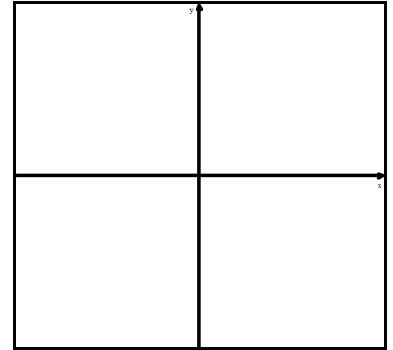
Graphic Verification:



(iv) $-6x + 2y = -4$
 $3x + y = 1$

Algebraic Verification:

Graphic Verification:



(v) Solve the system $4x + 2y = 10$
 $3y - 6x = 9$

Algebraic Verification:

Graphic Verification:

