A. Lesson Context

BIG PICTURE of this UNIT:	• 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:	Where we've been In Lessons 5-7 you have been working with systems of equations and solving them with Substitution and Elimination	Where we are Taking a look at some different scenarios that can arise when dealing with the solutions to a system of equation.	Where we are heading How do we apply the concept of "functions" to linear & exponential relations.

B. Lesson Objectives

Recap Last Clas

Solving a System with Substitution and Elimination and analyzing when there are solutions

Solving a System with Substitution and Elimination and analyzing when there are no solutions.

Solving a System with Substitution and Elimination and analyzing when there are infinite solutions.

Solving a system by graphing or with PolySmlt2.

C. Fast Five

Solve the following systems.

$$\begin{cases} 3x + 2y = 5 \\ -6x - 4y = -8 \end{cases} \qquad \begin{cases} 3x - 9y = 12 \\ -x + 3y = -4 \end{cases}$$

Find values of a and b so that the system $\begin{cases} 4x + 2y = 12 \\ ax + 4y = b \end{cases}$ has exactly one solution. Explain how the graphs of the equations will be related.

Task 1: Systems and the Calculator

    a.   Solve and verify the following linear systems with the graphing function.

$y = 2x - 4$ and $y = -x + 5$	$2x + 3y - 9 = 0$ and $x - y - 2 = 0$
$y = 5x - 2$ and $6x + 3y = 36$	$x + 4y = -10$ and $2x + y = 1$

    b.   Solve and verify the following linear systems using POLYSMLT2 ☺ If you are struggling with polysmlt or don't know what it is, go to the link on the website and watch a quick video on it!

$2x - 2y - 14 = 0$ $-2x + 4y - 4 = 0$	$3x - 2y = 17$ $-6x - 2y = 8$
$4x = 9 - y$ $3y - 6x = 9$	$2y + 4 = 6x$ $y + 3x = 1$

Solve and verify the following linear system by graphing or POLYSMLT

$y = \dfrac{1}{2}x - 3$ and $x + y = -6$	$x + 2y = 2$ and $x - y = 8$
$x + 2y = 7$ and $y = 4x - 10$	$y = -\dfrac{1}{2}x + \dfrac{9}{2}$ and $y = 3x - 6$

Substitution:

Create a System: Identify your variables, create the equations, Solve using substitution

You have some Egyptian Pounds in a pile. You know you have 5 LE bills, and 10 LE bills for a total of 210 LE if you add them all. You also know that the number of 10 LE bills is 9 less that twice the 5 LE Bills. How many of each bill do you have?

There are two new species of animals just discovered on mars. **Spraks** and **Borks. Spraks** have 3 legs and **Borks** have 7 legs. All together there are 288 legs on this planet. Also scientists notice that if you take 5 more than double the number of **Borks** you will have the **Spraks**. How many of each species are there?

Is the point (-3,-6) a solution to the system? Why or why not?

$$y = 3x + 9$$
$$x = 2y + 9$$

Please solve using substitution:

(i) $y = 2x - 4$ and $y = -x + 5$ **Algebraic Verification:**   **Graphic Verification:**

(ii) $2x + 3y - 9 = 0$ and $y = -x - 2$ **Algebraic Verification:**   **Graphic Verification:**

(iii) $y = 5x - 2$ and $6x + 3y = 36$ **Algebraic Verification:**   **Graphic Verification:**

Elimination:

Create a System: Identify your variables, create the equations, Solve using elimination.
Regina is training for the upcoming cross country season. She needs to design a daily 45 minute workout using a combination of a stationary bike and a treadmill. To be in top shape, she should burn 400 calories in her workout. On a bike, she burns 8 cal/min and on the treadmill she burns 10 cal/min. How many minutes should she train on each piece of equipment?

As the owner of a banquet hall, you are in charge of catering a reception. There are 2 dinners: a chicken dish that costs $16 and a beef dish that costs $18. The 300 wedding guests have ordered the dinners in advance and the total cost to prepare the dinners is $5256. How many of each type of dinner are you preparing?

You are selling tickets for a musical at ISM. Student tickets cost $5 and general admission tickets cost $8. If you sell 500 tickets and collect $3475, how many student tickets and how many general admission.

Please solve using Elimination

$4x = 9 - y$ **Algebraic Verification:**   **Polysmlt Check**
$3y - 6x = 9$

$2y + 4 = 6x$ **Algebraic Verification:**   **Polysmlt Check!**
$y + 3x = 1$

$4x + 2y = 10$ **Algebraic Verification:**   **Polysmlt Check!**
$3y - 6x = 9$

Practice Creating systems

For the following situations please do the following.

1. Read the problem.

2. Identify your variables

3. Write a system to represent your situation

4. Determine what method you would use to solve the system both algebraically and with technology… i.e. substitution or elimination and Graphing or Polysmlt.

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Variables	System	Circle methods of choice
Let x be… Let y be…		Substitution or Elimination Graphing or Polysmlt

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You are selling tickets for a musical at CAC. Student tickets cost $5 and general admission tickets cost $8. If you sell 500 tickets and collect $3475, how many student tickets and how many general admission.

Variables	System	Circle methods of choice
Let x be… Let y be…		Substitution or Elimination Graphing or Polysmlt

Yasser is renting a car. Zeno Car Rental charges $45 for the rental of the car and $0.10 per kilometre driven. Erdos Car Rental charges $35 for the rental of the same car and $0.25 per kilometre driven. Which company should Yasser choose to rent the car from?

Variables	System	Circle methods of choice
Let x be… Let y be…		Substitution or Elimination Graphing or Polysmlt

The school is putting on the play "Algebra: The Musical". Adult tickets were sold at a cost of $8 and student tickets were sold at a cost of $5. A total of 220 tickets were sold to the premiere and a total of $1460 was collected from ticket sales.

Variables	System	Circle methods of choice
Let x be… Let y be…		Substitution or Elimination Graphing or Polysmlt

Mr. S. has $18,000 savings in 2 accounts. My total interest earned for the year was $930. One account earns me 6% annual interest and the other account earns me 3% annual interest. How much do I have in each account?

Variables	System	Circle methods of choice
Let x be… Let y be…		Substitution or Elimination Graphing or Polysmlt

The yearbook club is considering two different companies to print the yearbook. The Descartes Publishing Company charges a flat fee of $475 plus $4.50 per book. School Memories charges a flat fee of $550 plus $4.25 per book. Which company should the yearbook club select to print this year's yearbook?

Variables	System	Circle methods of choice
Let x be… Let y be…		Substitution or Elimination Graphing or Polysmlt