(A) Lesson Context

BIG PICTURE of this UNIT:	• mastery with algebraic manipulations/calculations involving linear systems • proficiency in working with graphic and numeric representations of linear systems • proficiency in working with linear systems in real world scenarios		
CONTEXT of this LESSON:	Where we've been Lesson 4 reviewed graphic methods & Lesson 5 review the substitution method for solving linear systems	Where we are Consolidating skills in solving a linear systems algebraically	Where we are heading Mastery of solving & applying linear systems

(B) Lesson Objectives:

a. Consolidate skills involved when solving linear systems using the elimination method.
b. Solve word problems modelled by linear systems using algebraic methods

(C) Skill Consolidation – Algebra Skills ➜ Addition/Subtraction of Equations

You know that two integers can be added, or subtracted:

```
     5                    15
  +  7                 −   6
    12                     9
```

In the same way, equations can be added, or subtracted:

```
    3x + 2y = 19              10x + 20y = 80
 +  5x − 2y =   5          −  10x + 15y = 25
    8x      = 24                  5y = 55
```

Notice that by adding the equations in the first linear system, the y variable was eliminated (there were 0y), which makes it possible to solve for x.

By subtracting the equations in the second linear system, the x variable was eliminated (there were 0x), which makes it possible to solve for y.

1. Work in pairs to consider the following linear systems. Decide what operation – addition or subtraction – would result in the elimination of a variable.

$9x + y = 4$
$14x + y = -1$

$3x - y = 50$
$12x + y = 115$

$-7x - 6y = 338$
$9x + 6y = -366$

$18x - 5y = 454$
$12x - 5y = 316$

$19x + 2y = 102$
$19x - 2y = 50$

$17x - 8y = 323$
$6x + 8y = 114$

$9x - 4y = 235$
$15x + 2y = 409$

$7x - 16y = 441$
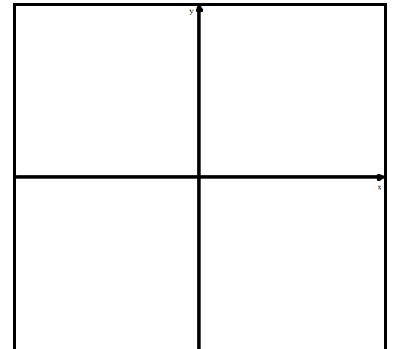$7x - 17y = 476$

$5x - 3y = 188$
$6x - 11y = 344$

2. What needs to be true about a linear system so that a variable is eliminated when the equations are added or subtracted?

(D)ELIMINTION Examples: Solve and verify the following linear systems:

(i) $2x - 2y - 14 = 0$
$-2x + 4y - 4 = 0$
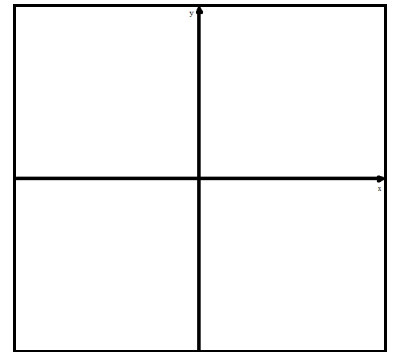
Algebraic Verification:

Graphic Verification:

(ii) $3x - 2y = 17$
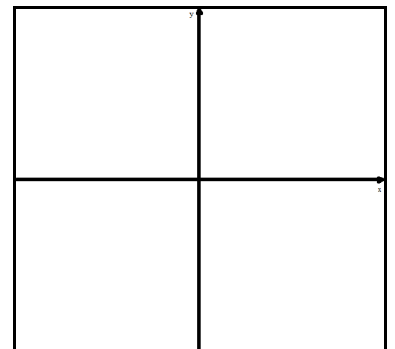$-6x - 2y = 8$

Algebraic Verification:

Graphic Verification:

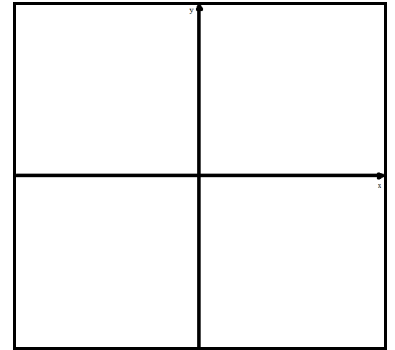(iii) $y + 4x = 9$
$3y - 6x = 9$

Algebraic Verification:

Graphic Verification:

(iv) $\begin{array}{l} -6x + 2y = -4 \\ 3x + y = 1 \end{array}$

Algebraic Verification:

Graphic Verification:

(v) Solve the system $\begin{array}{l} 4x + 2y = 10 \\ 3y - 6x = 9 \end{array}$

Algebraic Verification:

Graphic Verification:
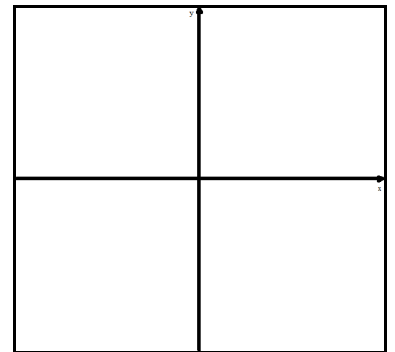
(E) Application of Linear Systems

❖ Ex 1. Guarantee Pool Repair Services charges $50 for a service call and $40/hour for labour. Oasis Pools and Spas charges $30 for a service call plus $45 for labour. Find the length of a service call for which both companies charge the same amount

EXPLAIN WHAT: the two variables should represent ➔ let x be …… let y be ……

EXPLAIN WHY: the 2 equations are ➔ y = 50 + 40x as well as y = 30 + 45x

❖ Ex 2. 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?

> EXPLAIN WHAT: the two variables should represent ➔ let x be …… let y be ……

> EXPLAIN WHICH PAIR OF EQUATIONS ARE CORRECT:

>> option (1) ➔ x + y = 400   as well as 8x + 10y = 45

>> option (2) ➔ x + y = 45 as well as   8x + 10y = 400

❖ Ex 3. 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?

> EXPLAIN WHAT: the two variables should represent ➔ let x be …… let y be ……

> EXPLAIN WHICH PAIR OF EQUATIONS ARE CORRECT:

>> option (1) ➔ x + y = 300   as well as 16x + 18y = 5256

>> option (2) ➔ x + y = 5256 as well as   16x + 18y = 300

❖ Ex 4. 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.

(A) HOMEWORK ➔ For Further Practice:

    a.   Nelson 10 Chap 1.6, p54-55, Q4, 5, 6, 7, 9

(B) Extra Help ➔

    a.   WORKED EXAMPLES at
       http://infinity.cos.edu/algebra/ProblemsSolved/Chapter%2004/Chapter%204_Word%20Problems.pdf
    b.   More worked and very well explained examples at http://www.algebra-class.com/solving-systems-of-equations.html
    c.   Video Help #1 ➔ http://www.youtube.com/watch?v=il2Mf5706hk
    d.   Video Help #2 ➔ http://www.youtube.com/watch?v=V-gmMeHiY5c&feature=relmfu

Video Links for Group #2

https://www.khanacademy.org/math/algebra/systems-of-eq-and-ineq/solving-systems-addition-elimination/v/solving-systems-by-elimination-2

https://www.khanacademy.org/math/algebra/systems-of-eq-and-ineq/solving-systems-addition-elimination/v/addition-elimination-method-1

https://www.khanacademy.org/math/algebra/systems-of-eq-and-ineq/solving-systems-addition-elimination/v/addition-elimination-method-2

https://www.khanacademy.org/math/algebra/systems-of-eq-and-ineq/solving-systems-addition-elimination/v/addition-elimination-method-3