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 Lesson 4, you practiced with the elimination & substitution methods for solving linear systems	Where we are Writing equations for problems involving 2 unknowns & using algebraic methods for solving systems	Where we are heading How do we apply the concept of "functions" to linear relations.

B. Lesson Objectives

a. Reviewing algebraic methods for solving simultaneous linear equations (elimination & substitution).
b. Determine what type of word problems lend themselves to y = mx + b vs. Ax + By = C.
c. Write pairs of equations to word problems to model real world scenarios involving two unknowns.

C. Fast Twenty:

Solve the systems below by SUBSTITUTION:

1. $y = 4x - 9$
   $y = x - 3$

3. $x + 7y = 0$
   $2x - 8y = 22$

5. $4x + 2y = 10$
   $x - y = 13$

7. $4x - y = 20$
   $-2x - 2y = 10$

Solve the systems below by ELIMINATION:

2. $8x - 6y = -20$
   $-16x + 7y = 30$

4. $6x - 12y = 24$
   $-x - 6y = 4$

6. $-4y - 11x = 36$
   $10 = -10x - 10y$

8. $0 = -2y + 10 - 6x$
   $14 - 22y = 18x$

D. Which type of Equation to write y=mx+b or Ax+By=C

Joseph works two part-time jobs; one as a math tutor for and a second job as a piano teacher. He makes $15 per hour as a math tutor and $25 per hour as a piano teacher. In order to save money for a trip to Sharm El Sheikh in October, Joseph would like to earn a total of $750 in one month of the summer, but he would like to work only 40 hours.

How many hours should he work as a piano teacher in order to save the required $750?

(a) Explain what the following equations might "mean"?

$y = 25x + 750$

$y = 15x + 750$

$y = 750 – 25x$

$y = 750x + 25$

$x + y = 40$

$x + y = 750$

$x + 15y = 40$

$x + 15y = 750$

$15x+25y = 40$

$15x + 25y = 750$

(b) To help with equation writing, we need to decide what variables we need. So, what are the "unknowns" in our problem?

(c) So, finally, which pair of equations would be best for modeling this problem?

Alex needs to rent a minivan for a week to take his band on tour. EasyVans charges $230 plus $0.10/km while Carz charges $150 plus $0.22/km.

Which company do you recommend for Alex and his band? Why?

(a) Explain what the following equations might "mean"?

$150x + 0.22y = 230$

$0.10x + 0.22y = 150$

$x + y = 230$

$x + y = 0.10$

$150x + 230y = 0.22$

$y = 230x + 0.10$

$y = 0.1x + 0.22$

$y = 150x + 230$

$y = 0.22x + 150$

(b) To help with equation writing, we need to decide what variables we need. So, what are the "unknowns" in our problem?

(c) So, finally, which pair of equations would be best for modeling this problem?

E. Equation Writing from Word Problems

Practice #1 (Nelson Chap 1.3)

Hayley wants to rent a car for a weekend trip. Kelly's Kars charges $95 for the weekend plus $0.15/km. Rick's Rentals charges $50 for the weekend plus $0.26/km. Which company charges less?

Practice #2 (Nelson Chap 1.3)

Ellen drives 450 km from her university in Kitchener-Waterloo to her home in Smiths Falls. She travels along one highway to Kingston at 100 km/h and then along another highway to Smiths Falls at 80 km/h. The journey takes her 4 h 45 min. What is the distance from Kingston to Smiths Falls?

Practice #3 (Nelson Chap 1.3)

Joanna is considering two job offers. Phoenix Fashions offers $1500/month plus 2.5% commission. Styles by Rebecca offers $1250/month plus 5.5% commission.

a) Create a linear system by writing an equation for each salary.
b) What value of sales would result in the same total salary for both jobs?
c) Which job should Joanna take? Explain your answer.

Practice #4 (Nelson Chap 1.3)

Six cups of coffee and a dozen muffins originally cost $15.35. The price of a cup of coffee increases by 10%. The price of a dozen muffins increases by 12%. The new cost of six cups of coffee and a dozen muffins is $17.06. Determine the new price of one cup of coffee and a dozen muffins.

Practice #5 (Nelson Chap 1.3)

Willow bought 3 m of denim fabric and 5 m of cotton fabric. The total bill, excluding tax, was $22. Jared bought 6 m of denim fabric and 2 m of cotton fabric at the same store for $28.

a) Write a linear system you can solve to determine the price of denim fabric and the price of cotton fabric.

b) Solve your system using a graph.

c) How much will 8 m of denim fabric and 5 m of cotton fabric cost?

Practice #6 (Nelson Chap 1.3)

A regular light bulb costs $0.65 to buy, plus $0.004/h for the electricity to make it work. A fluorescent light bulb costs $3.99 to buy, plus $0.001/h for the electricity.

a) Write a cost equation for each type of light bulb.

b) Graph the system of equations using a graphing calculator. Use the window settings $0 \leq X \leq 2000$ and $0 \leq Y \leq 10$.

c) After how long is the fluorescent light bulb cheaper than the regular light bulb?

d) Determine the difference in cost after one year of constant use.

Practice #7 (Nelson Chap 1.3)

The drama department of a school sold 679 tickets to the school play, for a total of $3370. Students paid $4 for a ticket, and non-students paid $7.

a) Write a linear system for this situation.

b) How many non-students attended the play? Solve the problem by graphing your system.

Practice #8 (Nelson Chap 1.3)

Extending

17. **a)** Solve the linear system $3x - y - 11 = 0$ and $x + 2y + 1 = 0$.

b) Show that the line with the equation $9x + 4y - 19 = 0$ passes through the point where the lines in part a) intersect.

c) Determine the values of c and d if $9x + 4y - 19 = 0$ is written in the form $c(3x - y - 11) + d(x + 2y + 1) = 0$.

18. Solve the linear system $y = 2x - 1$, $4x - 3y = 7$, and $6x + y + 17 = 0$.

19. Solve each system of equations.

a) $y = 2x^2$
$y = -3x + 5$

b) $y = \sqrt{x}$
$y = x - 1$