

**(A) Lesson Context**

BIG PICTURE of this UNIT:	<ul style="list-style-type: none"> <li>mastery with algebraic manipulations/calculations involving linear systems</li> <li>proficiency in working with graphic and numeric representations of linear systems</li> <li>proficiency in working with linear systems in real world scenarios</li> </ul>		
CONTEXT of this LESSON:	Where we've been  Lessons 4,5,6 reviewed methods for solving linear systems	Where we are  Writing equations for a word problem involving linear systems	Where we are heading  Mastery of solving & applying linear systems

**(B) Lesson Objectives:**

- Write equations that can be used to model linear systems in word problems (REVIEW)
- Interpret the meaning of an intersection point given the context of a word problem (REVIEW)
- Verify a solution to a linear system. (REVIEW)

**(C) 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 IS 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 IS 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.

EXPLAIN WHAT: the two variables should represent → let  $x$  be ..... let  $y$  be .....

WRITE THE EQUATIONS FOR THE TWO LINES THAT MAKE UP THIS SYSTEM.

Ex 5. 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?

EXPLAIN WHAT: the two variables should represent → let  $x$  be ..... let  $y$  be .....

WRITE THE EQUATIONS FOR THE TWO LINES THAT MAKE UP THIS SYSTEM.

Ex 6. 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.

EXPLAIN WHAT: the two variables should represent → let  $x$  be ..... let  $y$  be .....

WRITE THE EQUATIONS FOR THE TWO LINES THAT MAKE UP THIS SYSTEM.

Ex 7. To raise money for a local shelter, some grade 10 students held a car wash and charged \$8 per car and \$12 per van. They washed 64 vehicles and raised \$688. How many of each type of vehicle did they wash?

EXPLAIN WHAT: the two variables should represent → let  $x$  be ..... let  $y$  be .....

WRITE THE EQUATIONS FOR THE TWO LINES THAT MAKE UP THIS SYSTEM.

Ex 8. The school council is trying to determine where to hold the athletic banquet. The Algebra Ballroom charges an \$800 flat fee and \$60 per person. The Geometry Hall charges a \$1000 flat fee and \$55 per person. Which location should the school council select for the athletic banquet?

EXPLAIN WHAT: the two variables should represent → let  $x$  be ..... let  $y$  be .....

WRITE THE EQUATIONS FOR THE TWO LINES THAT MAKE UP THIS SYSTEM.

Ex 9. 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?

EXPLAIN WHAT: the two variables should represent → let x be ..... let y be .....

WRITE THE EQUATIONS FOR THE TWO LINES THAT MAKE UP THIS SYSTEM.

Ex 10. An executive traveled 1930 miles by car and plane. He drove to the airport at an average speed of 60 mph and the plane averaged 350 mph. The total trip took 8 hours. How long did it take to get to the airport?

EXPLAIN WHAT: the two variables should represent → let x be ..... let y be .....

WRITE THE EQUATIONS FOR THE TWO LINES THAT MAKE UP THIS SYSTEM.

Ex 11. Next week your math teacher is giving a chapter test worth 100 points. The test will consist of 35 problems. Some problems are worth 2 points and some problems are worth 4 points. How many problems of each value are on the test?

EXPLAIN WHAT: the two variables should represent → let x be ..... let y be .....

WRITE THE EQUATIONS FOR THE TWO LINES THAT MAKE UP THIS SYSTEM.

Ex 12. 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?

EXPLAIN WHAT: the two variables should represent → let x be ..... let y be .....

WRITE THE EQUATIONS FOR THE TWO LINES THAT MAKE UP THIS SYSTEM.

### **(D)Extra Help →**

- WORKED EXAMPLES at [http://infinity.cos.edu/algebra/ProblemsSolved/Chapter%2004/Chapter%204\\_Word%20Problems.pdf](http://infinity.cos.edu/algebra/ProblemsSolved/Chapter%2004/Chapter%204_Word%20Problems.pdf)
- More worked and very well explained examples at <http://www.algebra-class.com/solving-systems-of-equations.html>

(E) **Which Method?**

$$2x + 3y = 10$$

System A

$$-4x + 5y = 2$$

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$$y = x - 2$$

System B

$$x + 5y = -4$$

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$$y = 2x - 7$$

System C

$$y = -4x + 5$$