JUNE 2, 2017

UNIT 4: SYSTEMS OF LINEAR EQUATIONS

7.5: USING AN ELIMINATION STRATEGY TO SOLVE A SYSTEM OF LINEAR EQUATIONS

M. MALTBY INGERSOLL

NUMBERS, RELATIONS AND FUNCTIONS 10

WHAT'S THE POINT OF TODAY'S LESSON?

We will continue working on the NRF 10 Specific Curriculum Outcome (SCO) "Relations and Functions 10" OR "RF10" which states:

RF10: "Solve problems that involve systems of equations in two variables graphically and algebraically."

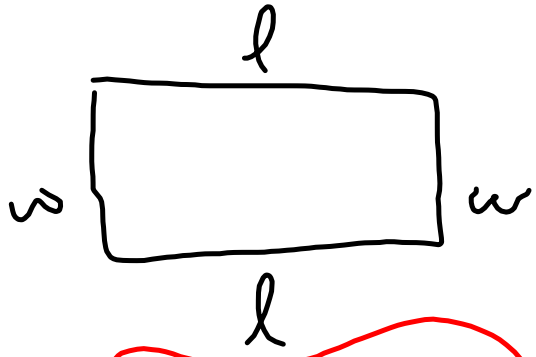
What does THAT mean???

SCO RF10 means that we will:

- **model a situation using a system of linear equations**
- **relate a system of linear equations to the context of a problem**
- **determine and verify the solution of a system of linear equations graphically**
- **explain the meaning of the point of intersection of a system of linear equations**
- **determine and verify the solution of a system of linear equations algebraically**
- **explain, using examples, why a system of equations may have no solution, one solution or an infinite number of solutions**
- **explain a strategy to solve a system of linear equations**
- **solve a problem that involves a system of linear equations**

HOMEWORK QUESTIONS???
(pages 425 / 426, #6, #10, #11, #12, #14 & #16)

11.



$2\ell + 2w = 540$ (1)

$\ell = w + 90$ (2)

$2\ell + 2w = 540$ (1)

$2(w+90) + 2w = 540$

$2w + 180 + 2w = 540$

$4w = 360$

$w = 90\text{ cm}$

$\ell = w + 90$ (2)

$\ell = 90 + 90$

$\ell = 180\text{ cm}$

HOMEWORK QUESTIONS???
(pages 425 / 426, #6, #10, #11, #12, #14 & #16)

14. Let x represent the number of people masks.

Let y represent the number of animal masks.

$$x + y = 85 \quad (1)$$
$$0.60x + 0.40y = 38 \quad (2)$$

$$6x + 4y = 380 \quad (3)$$

$$x = 85 - y \quad (1)$$

$$6x + 4y = 380 \quad (3)$$
$$6(85 - y) + 4y = 380$$
$$510 - 6y + 4y = 380$$
$$-2y = -130$$
$$y = 65$$

$$x + y = 85 \quad (1)$$
$$x + 65 = 85$$
$$x = 20$$

$x = 20$ people masks ; $y = 65$ animal masks

You currently know how to solve linear systems GRAPHICALLY and by SUBSTITUTION; however, these strategies are often time-consuming and even somewhat confusing.

As previously mentioned, there are TWO algebraic strategies we can use to determine an exact solution for a linear system. SOLVING BY SUBSTITUTION is the first, and SOLVING BY ELIMINATION is the second. We will now learn how to solve by ELIMINATION.

EXAMPLE:

Consider this linear system.

$$2x + y = -7 \quad ①$$
$$x + y = -4 \quad ②$$

① - ②

$$\begin{array}{r} 10 \\ -\ 8 \\ \hline 2 \end{array}$$

Because the coefficients of y are equal, we can eliminate y by subtracting the equations.

Subtract equation ② from equation ① to determine the value of x.

$$\begin{array}{rl} 2x + y = -7 & ① \\ -(x + y = -4) & ② \\ \hline 2x + y - x - y = -7 - (-4) & \\ x = -3 & \end{array}$$

Substitute $x = -3$ into equation ① to determine the value of y.

$$\begin{array}{rl} 2x + y = -7 & ① \\ 2(-3) + y = -7 & \\ -6 + y = -7 & \\ y = -1 & \end{array}$$

x = -3 and y = -1

VERIFICATION: x = -3 and y = -1.

$$2x + y = -7$$
$$2(-3) + (-1) = -7$$
$$-6 - 1 = -7$$
$$-7 = -7$$

$$x + y = -4$$
$$-3 + (-1) = -4$$
$$-3 - 1 = -4$$
$$-4 = -4$$

YOU TRY!

Solve this linear system by elimination:

$$\begin{array}{l} x + 4y = 12 \quad (1) \\ +(-x + y = 8) \quad (2) \end{array} \qquad (1) + (2)$$

$$5y = 20$$
$$y = 4$$

$$-x + y = 8$$
$$-x + 4 = 8$$
$$-x = 4$$
$$x = -4$$

$$x = -4 \; ; \; y = 4$$

$$\begin{array}{r} 12 \\ +\ 3 \\ \hline 15 \end{array}$$

ex: $3x - 4y = 7$ (1) (×5)

$5x - 6y = 8$ (2) (×3)

$15x - 20y = 35$ (3)

$-(15x - 18y = 24)$ (4) (3) − (4)

$-2y = 11$

$y = -5.5$

$3x - 4y = 7$

$3x - 4(-5.5) = 7$

$3x + 22 = 7$

$3x = -15$

$x = -5$

$x = -5$; $y = -5.5$

VERIFICATION: x = -5 and y = -5.5

$$3x - 4y = 7$$
$$3(-5) - 4(-5.5) = 7$$
$$-15 + 22 = 7$$
$$7 = 7$$

$$5x - 6y = 8$$
$$5(-5) - 6(-5.5) = 8$$
$$-25 + 33 = 8$$
$$8 = 8$$

CONCEPT REINFORCEMENT:

***FPCM*:**
PAGE 437: #3 and #6

Attachments

Worksheet - Review of Coordinate Geometry (Math 10).doc

area of a triangle.doc

coord geom review.doc

Puzzle Worksheet - Graphing #2 (Coffee).pdf

Puzzle Worksheet - Graphing #1 (Cow).pdf

Puzzle Worksheet - Slope Point (given both).pdf

Puzzle Worksheet - Slope Point (given two points).pdf

Worksheet - Equation of a Line.pdf

Worksheet Solutions - Equation of a Line.pdf

Worksheet - Distance_Midpoint(2).pdf

Review - Coordinate Geometry.pdf