

EISENHOWER PROFESSIONAL DEVELOPMENT PROGRAM

Mathematics Within: Algebraic Patterns

Lesson Plan - Part 2

(Part 1-Lynn Bartol)

Participant Name: Judy Klatt

Broad Topic: Area Model: "Smackdown"

Subtopic: Creating and solving equations with variables

Aim:

To create and solve equations with variables in game format

Specific Objective(s):

- o Apply the area model using variables
- o Successfully use the area model using variables to create equation
- o Accurately substitute values for variables to solve equation
- o Interpreting patterns on the recording sheet from the game played

Materials/Supplies:

Per student:

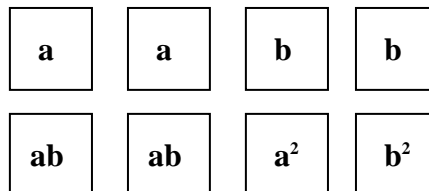
- o Recording sheet
- o Pencil
- o Wrestling mat

Teacher materials:

Overhead and markers
Transparency: recording sheet
Chart paper: wrestling mat
Baby wipes OR toweling/water bottle
Demonstration cards:

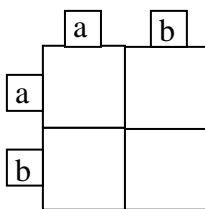
Per student pair:

- o Number cards 1-9 (3 of each)
- o Variable cards "a", "b" (6 of each)
- o Calculator
- o 1 "a" spinner
- o 1 "b" spinner



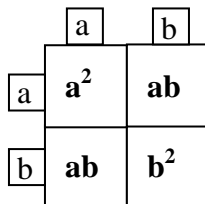
Lesson:

- o Teacher Demonstration materials: demonstration game mat, demonstration variable cards, transparency of recording sheet, spinners "a" and "b"
- o Smackdown is very similar to Multiplication Wrestling, but with some differences: the columns on the game board no longer represent tens and ones and variables are used in place of numbers.
- o Teacher Demonstration:
 1. Demonstrate drawing four variable cards (use the demonstration cards). Place variable cards on the demonstration game mat.



Note: Variable cards may be placed in any order.

2. Involve students in the discussion of how to multiply the variable using the area model established in Multiplication Wrestling. During this discussion, place the remaining demonstration variable cards in the appropriate boxes.



Discuss (using numerical values): $a \cdot a = a^2$

$$ab = ba$$

- Using the transparency, demonstrate how to record the variable equation on the recoding sheet on the first line:
 $(a+b) \cdot (a+b) = a^2 + ab + ab + b^2$
- Establish the values for the variables by spinning the appropriate spinner (“a” spinner for variable “a”, etc.). Demonstrate where to record these values on the recoding sheet.
- On the second and third lines of the recoding sheet, demonstrate how to write the equation substituting the values for the variables and to then solve the equation.
 Example: Given values of “a” = 3; “b” = 2

$$(a+b) \cdot (a+b) = a^2 + ab + ab + b^2$$

$$(3+3) + (3 \cdot 2) + (3 \cdot 2) + (2 \cdot 2)$$

$$9 + 6 + 6 + 4 = 25$$

To Play

- o Players take turns.
- o Each player completes one turn in creating and solving an equation – this must be recorded on the player’s record sheet:
 - o Draw 4 variable cards
 - o Place the 4 cards on the game mat
 - o Recording sheet: record the variables on the game mat
create the variable equation (line one)
 - o Spin to determine the value(s) for the variable(s)
 - o Recording sheet: record the value(s) for the variable(s)
substitute the values for the variables (line two)
solve the equation (line three)
- o After the players have each completed one equation, the results are compared. The player whose equation is worth the most circles their result on their recording sheet.
- o Repeat three times. The player who has the most circles after the three rounds wins the game.

Game variations:

- o Draw one variable and one number card for each side of the game mat.
- o Draw two operation signs (addition/subtraction), one for each side of the game mat.
- o Use negative and positive numbers.
- o Lowest score wins each round.
- o Score closest to a target number wins each round.

Game extensions:

- o Students may begin on their own to combine like elements in their equations. This would then be the time to formalize this thought and adapt the recording of equations to reflect this new skill.
- o Once students are adept at the game, challenge them to determine the factors (the four cards drawn to begin each turn) necessary to create given equations. In other words, work backwards!

Text or Website references:

Everyday Math—Level 5—extension of “Multiplication Wrestling”

a

a

a

a

a

a

a

a

a

b

b

b

b

b

b

b

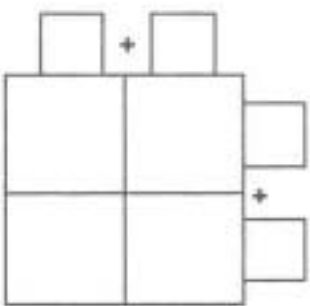
b

b

1	2	3
4	5	<u>6</u>
7	8	9

+

+



$$(\text{---} + \text{---}) \times (\text{---} + \text{---}) = \text{---} + \text{---} + \text{---} + \text{---}$$

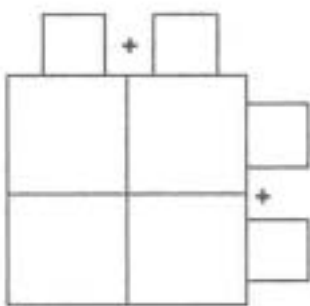
Values:

$$a = \text{---}$$

$$b = \text{---}$$

$$\text{---} + \text{---} + \text{---} + \text{---}$$

$$\text{---} + \text{---} + \text{---} + \text{---} = \text{---}$$



$$(\text{---} + \text{---}) \times (\text{---} + \text{---}) = \text{---} + \text{---} + \text{---} + \text{---}$$

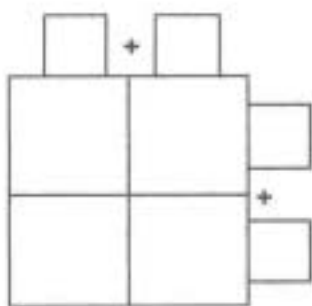
Values:

$$a = \text{---}$$

$$b = \text{---}$$

$$\text{---} + \text{---} + \text{---} + \text{---}$$

$$\text{---} + \text{---} + \text{---} + \text{---} = \text{---}$$



$$(\text{---} + \text{---}) \times (\text{---} + \text{---}) = \text{---} + \text{---} + \text{---} + \text{---}$$

Values:

$$a = \text{---}$$

$$b = \text{---}$$

$$\text{---} + \text{---} + \text{---} + \text{---}$$

$$\text{---} + \text{---} + \text{---} + \text{---} = \text{---}$$