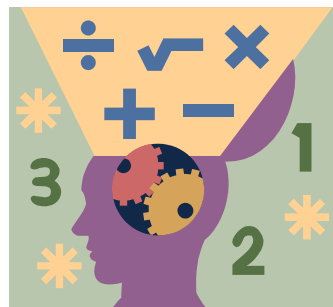


NCLB Math Institute Summer 2011

Faculty Name: Diana Bell Sanders

School: John F. Kennedy Memorial High School

Grade Level: 5th



Using Number Sense to Integrate Literature (5-Day Plan)

I. Teaching objective(s):

- MS 3d: Model and distinguish between prime and composite numbers. **(DOK 1)**
- MS 3c: Identify factors and multiples of whole numbers. **(DOK 1)**
- MS 4c: Develop, compare, and use formulas and calculate the perimeter and area of rectangles, triangles, and parallelograms. **(DOK 2)**

II. Instructional Activities

DAY ONE:

Introduction:

- Teacher will tell students that they will investigate some unique relationships between literature and mathematics.
- Teacher will read the story entitled, “One Hundred Hungry Ants” to the class.
- Teacher will place students in groups of two’s.
- Teacher will give each group grid paper and a set of highlighters (yellow, blue, orange, and green).
- Teacher will use students’ previous knowledge of multiplication facts to define factors (numbers being multiplied).
- Have students to give examples of multiplication number sentences and identify the factors. (Examples will vary)
- Teacher will write two prime numbers on the board. Teacher will ask students what is the special relationship between the two numbers.
- Have students to state if either of the two numbers have any factors other than one and themselves.

- Teacher will state that these numbers are called prime numbers (have only two factors one and itself).

Activity:

- Teacher will pass out the “100 chart sheet” (**Attachment 1**) and ask students if the number “1” is a prime number. (**Findings: the number one is not a prime number because it has only one factor, itself.**)
- Have students to cross out the number “1” in the 100 Chart.
- Teacher will tell students to locate the prime numbers between “1 and 100”.
- Have students to locate and use the blue highlighter to shade the Prime numbers.
- Have designated students to write the prime numbers between “1 and 100” on the board.
- Teacher will write two composite numbers on the board. Then ask students if either number have any factors other than “1” and itself.
- Teacher will state that these numbers are composite numbers because they have more than two factors.
- Teacher will tell students to locate the composite numbers between “1 and 100”.
- Have students to use the “100 Chart” to locate and use the orange highlighter to shade the composite numbers.
- Have designated students to write the composite numbers between “1 and 100” on the board.

Closure:

- After students have completed the task, have them to discuss patterns and/or findings. (**Findings: prime numbers have only two factors, one and itself. While composite numbers have more than two factors.**)
- Teacher will reread the passage, “One hundred ants singing and marching in a row”.
- Have students to discuss and explain the relationship between the above passage and the prime/composite number activity.
- Have students to cut the ten horizontal strips and connect them with transparent tape and post strips on the wall. (**This is representative of the 100 ants in a row**)

DAY TWO:

Introduction:

- Teacher will use students' previous knowledge of multiplication facts to define multiple (**Multiple is the product of two or more factors**).
- Have students to state examples of multiplication number sentences and identify the factors and multiples. (**Example: $3 \times 2 = 6$; "3" and "2" are the factors while 6 is the multiple and/or product**)
- Teacher will place students in groups of two's, give each group a set of "100 Chart" sheets (**Attachment 1**), and set of highlighters.

Activity:

- Have students to use the highlighter or to write the number "2" in large bold print at the top of the chart.
- Have students to circle the number "2" on the chart and use a highlighter to color all the multiples of "2" between "1 and 100".
- Teacher will ask students to state the pattern and/or findings. [**Findings: each term (multiple) increases by two.**]
- Have students to take another card and highlighter and write the number "3" in large bold print at the top
- Have students to circle the number "3" on the chart and use a highlighter to color all the multiples of "3" between "1 and 100".
- Teacher will ask students to state the pattern and/or findings. [**Findings: each term (multiple) increases by three.**]
- Have students to write the numbers "2 and 3" at the top of a new chart.
- Have students to put the "2" and "3" charts side by side and study them.
- Have students to identify the common multiples and write them in the new chart.
- Teacher will introduce the term least common multiple. [**LCM is the smallest of the common multiples.**]
- Have students to write the first seven prime numbers (2, 3, 5, 7, 11, 13, and 17), draw the diagram \lfloor _____, and the set (10, 15) on paper.
- Teacher will explain and demonstrate how to use the Prime Factor Column (**Attachment 2**) to find the LCM for a set of two numbers.

Prime Factor Column Activity Steps:

- a. List the first seven prime numbers.
- b. Draw the skillet \lfloor _____ .
- c. Insert the numbers in the skillet. 10,15
- d. Go through the list of prime numbers and find a number that can be equally divided into both numbers. (In this case, the number is 5)

- e. Write the prime number in front of the skillet and divide. $5 \overline{)10,15}$
- f. Shift and draw another skillet below the previous skillet and write the answer in the second skillet. $5 \overline{)10,15}$
 $\quad \quad \quad \underline{1} \overline{)2, 3}$
- g. Keep dividing until there are no common factors. When you can no longer divide, put a “1” in front of the skillet. The “1” is an indication to stop dividing. $5 \overline{)10,15}$
 $\quad \quad \quad \underline{1} \overline{)2, 3}$
- h. List the factors in order and multiply [$2 \times 3 \times 5 = 30$]. The LCM is 30.

Closure:

- Have the class to use knowledge gained during activity to distinguish between a common multiple and least common multiple. [**Findings: a common multiple has the same value found in both lists of multiples and least common multiple is the smallest of the common multiples**]
- Teacher will have students to continue to work with new charts, highlighters, the Prime Factor Column, and designated set of numbers to find common and least common multiples.

DAY THREE:

Introduction:

- Teacher will place students in groups of four’s and give each group several sheets of grid paper (**Attachment 3**) and a container with 1” inch square tiles.
- Teacher will discuss and explain that area is the number of square units that covers a shape and demonstrate how to calculate area of quadrilaterals (by multiplying length times width).
- Teacher will explain what a dimension is and how columns (length) and rows (width) are used to make up a dimension.

Activity:

- Have students to use 1” inch square tiles to model designated rectangles then draw and label each rectangle on the grid paper. [Labeling includes showing length (columns) and width (rows) of each rectangle.]
- Have students to use the square tiles to model the following rectangles; 2” by 50”, 50” by 2”, 4” by 25”, 25” by 4”, “5 by 20”, 20” by 5”, and 10” by 10”.
- After students have completed the task, have them to share answers and/or findings. [**Findings: all areas of the rectangles are the same; the**

dimensions of the rectangles were determined by the number of columns and rows in each, and the product (area) is equal to the number of squares that made up the rectangles.]

Closure:

- Teacher will ask questions to check for students' understanding such as; "what is the difference between the dimensions "2 by 50" and "50 by 2" ? **(Possible answer: a 2" by 50" has 2 rows and 50 columns, while a 50" by 2" has 50 rows and 2 columns.)** Referring to the dimensions given, the teacher will also ask students what the squares and rectangles represented. (Squares represented factors and rectangles represented the product of the factors.)
- Teacher will reread pp. 5 and 6 (2 lines of 50), 11-13 (4 lines of 25), 15-17 (4 lines of 20), and 19-21(10 lines of 10) and have students to discuss how the passages are related to the activity.

DAY FOUR:

Introduction:

- Teacher will discuss and explain that the perimeter is the sum of the length and width of a polygon and/or the sum of all the sides.
- Teacher will place students in previous day's groups.
- Teacher will give each group a container of 1" square tiles and their previous day's complete grid sheets.

Activity:

- Have students to use the square tiles to model the following rectangles; 2" by 50", 50" by 2", 4" by 25", 25" by 4", 5" by 20", 20" by 5", and 10" by 10" and calculate the perimeter of each.

Closure:

- Have students to distinguish between area and perimeter of the rectangles.

Possible Questions:

1. How were the dimensions used to calculate the area? Perimeter?
 2. What is the relationship between the dimensions and area of the rectangles?
 3. What is the relationship between the dimensions and perimeter of the rectangles?
 4. What is the relationship between the dimensions of the rectangles and the term factors?
 5. What is the relationship between the area of the rectangles and the term multiple?
- Teacher will display grid models throughout the classroom.

DAY FIVE:

Evaluation:

- Have students to use manipulatives, resource materials, and learned skills to complete the summative performance evaluation (**Attachment 4**).

III. Materials and Resources:

- Scissors
- Highlighters set (yellow, blue, orange, and green)
- 100 Chart sheets
- Transparent tape
- 1” inch square tiles
- Literature: “One Hundred Hungry Ants”
- Grid paper
- Teacher generated summative performance test

Resources:

Pinczes, Elinor J., One Hundred Hungry Ants, Houghton Mifflin Company, Boston, 1993.

Stenmark, Jean Kerr; Thompson, Virginia; and Cossey, Ruth; Family Math, Regents, University of California, 1986.

IV. Assessment:

- Teacher generated summative performance test
- Observation of students while completing each task
- Modeling and drawing (grid models)of rectangles
- Students’ oral responses

Attachment 1:

Hundreds Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Attachment 2:

Prime Factor Column

Problem Setup

Prime Numbers: 2, 3, 5, 7, 11, 13 and 17

Prime Factor Column Setup

$$\begin{array}{r} 5 \overline{)10,15} \\ 1 \overline{)2,3} \end{array}$$

The Least Common Multiple is 30 because $2 \times 3 \times 5 = 30$ (It is not necessary to write the one factor because of the Identity Property)

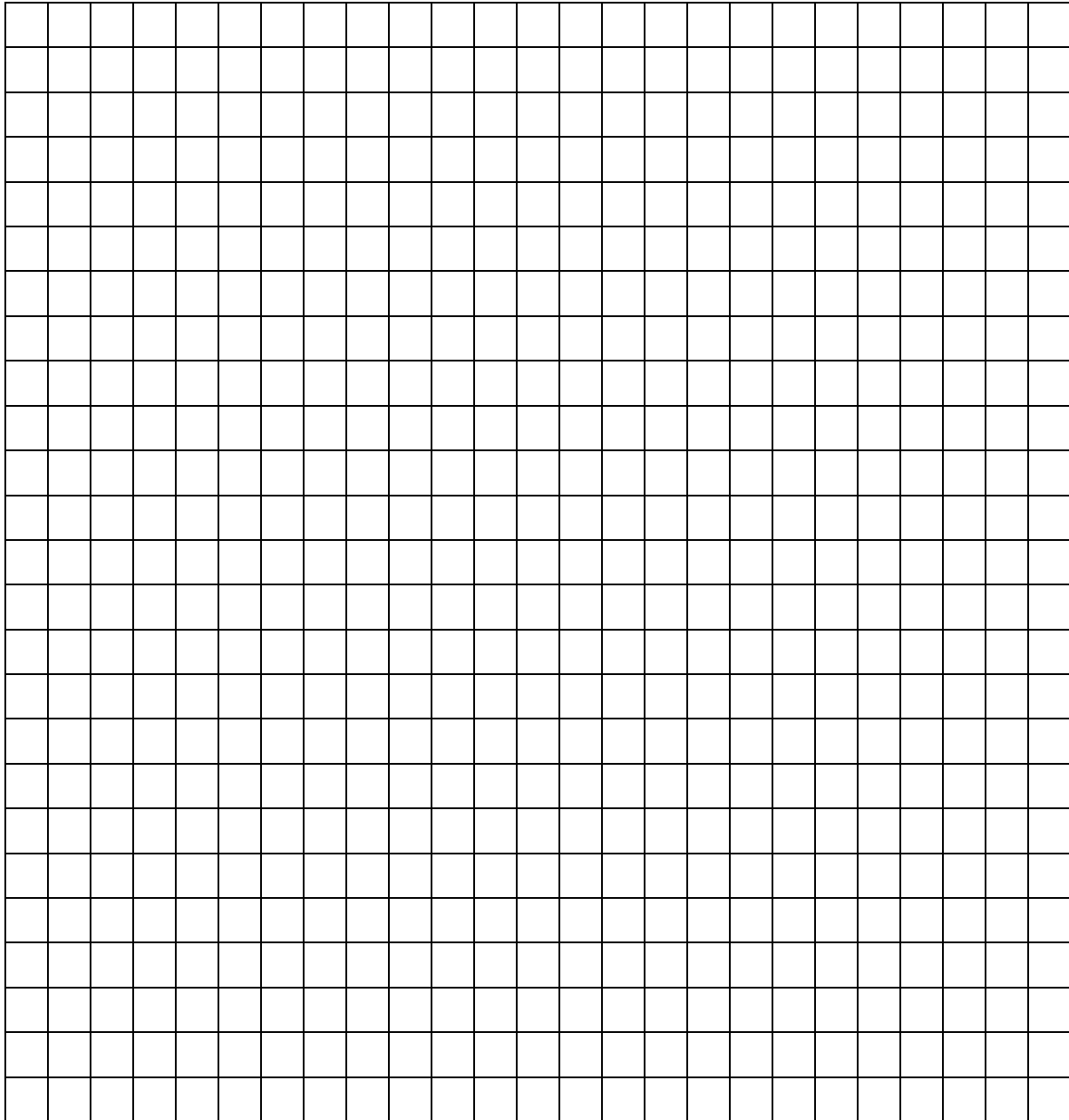
***The procedure for a set of 3 or more numbers works differently.**

Attachment 3:

Name _____ Date _____ Class Hour _____

Grid Sheet

Directions: Use the grid below to draw and label the rectangular models for your assigned numbers. Include all rectangles for each assigned number. The use of coloring crayons is optional.



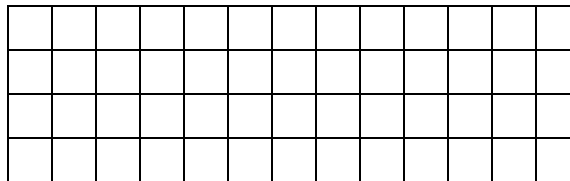
Attachment 4:

Name _____ Date _____

Summative Performance Evaluation:

- A. Use 12 “1 inch” square tiles and grid paper to model as many rectangles as possible.
- B. Referring to “A” above, find the area for each rectangle. Are they the same? _____ Explain your answer.
- C. Referring to “A” above, find the perimeter of each of the rectangles. Are they the same? _____ Explain your answer.
- D. Is the area of a 45cm x 55cm rectangle (in cm^2) smaller or bigger than that of a square with the same perimeter?
- E. Can you have a rectangle whose area is 1 and whose perimeter is 2? Explain your answer.
- F. Use grid paper to draw a rectangle with an area of 12 cm^2 and a perimeter of 14 cm.
- G. Write a number sentence for area that matches the dimensions of the array given below.

= 1 square inch



- H. What is the perimeter and area of the array above?
- I. Use the Prime Factor Column to find the least common multiple (LCM) for each set of numbers.
 - a.) 3, 27
 - b.) 7, 11
 - c.) 4, 30
 - d.) 24, 30
 - e.) 10, 12
 - f.) 15, 35

Summative Performance Evaluation Answer Key

- A. Use 12 “1 inch” square tiles and grid paper to model as many rectangles as possible.

Answers: “12 by 1”, “1 by 12”, “2 by 6”, “6 by 2”, “3 by 4”, “4 by 3”
(See grid attachment)

- B. Referring to “A” above, find the area for each rectangle. Are they the same? _____ Explain your answer.

Answers:

1.) $12 \times 1 = 12$

2.) $1 \times 12 = 12$

3.) $2 \times 6 = 12$

4.) $6 \times 2 = 12$

5.) $3 \times 4 = 12$

6.) $4 \times 3 = 12$

All areas are the same because 1, 2, 3, 4, 6, and 12 are factors of 12.

- C. Referring to “A” above, find the perimeter of each of the rectangles. Are they the same? _____ Explain your answer.

Answers:

1.] $(2 \times 12) + (2 \times 1) = 26$

2.] $(12 \times 2) + (1 \times 2) = 26$

3.] $(2 \times 6) + (2 \times 2) = 16$

4.] $(6 \times 2) + (2 \times 2) = 16$

5.] $(2 \times 3) + (2 \times 4) = 14$

6.] $(3 \times 2) + (4 \times 2) = 14$

No, all perimeters are not the same. The perimeters are not the same because the different dimensions of the rectangle changes the distance around it.

- D. Is the area of a 45cm x 55cm rectangle (in cm^2) smaller or bigger than that of a square with the same perimeter?

Answers:

1. **Area of the 45cm and 55cm rectangle is 2475 cm^2 .**

2. **The perimeter is 200 cm.**

3. **The perimeter of the square is 200cm. Since all sides are equal, each side is 50 cm.**

4. **Therefore, the area of the square is 2500 cm^2 .**

The area of the square is bigger than the area of the rectangle.

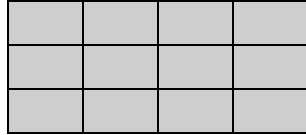
- E. Can you have a rectangle whose area is 1 and whose perimeter is 2? Explain your answer.

Answer:

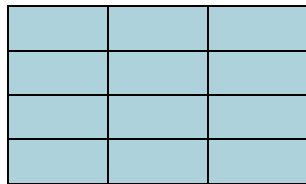
No, because if each side of the rectangle is “1”, the perimeter is “4” because all sides are added together to obtain the perimeter. This type of rectangle is a square because all sides are equal.

- F. Use grid paper to draw a rectangle with an area of 12 cm^2 and a perimeter of 14 cm.

Answer:



or

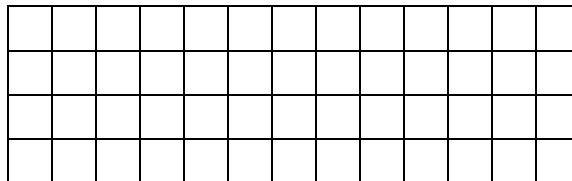


First rectangle is a “4 by 3” and the second is a “3 by 4”.

- G. Write a number sentence for area that matches the dimensions of the array given below.



= 1 square inch



Answer:

Number sentence: $13 \times 4 = 52$

- H. What is the perimeter and area of the array above?

Answers:

$(2 \times 4) + (2 \times 13) = 34$

Perimeter = 34 inches

$13 \times 4 = 52$

Area = 52 cm^2

- I. Use the Prime Factor Column to find the least common multiple (LCM) for each set of numbers.

a.) 3, 27 (**LCM: 27**)

d.) 24, 20 (**LCM: 120**)

b.) 7, 11 (**LCM: 77**)

e.) 10, 12 (**LCM: 60**)

c.) 4, 30 (**LCM: 60**)

f.) 15, 35 (**LCM: 105**)

Name _____ Date _____ Class Hour _____

Grid Attachment (Problem # 1)

Directions: Use the grid below to draw and label the rectangular models for your assigned numbers. Include all rectangles for each assigned number. The use of coloring crayons is optional.

