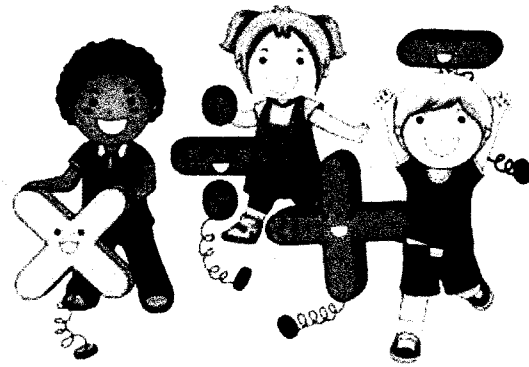


Place Value: Building Bridges
to
Understanding and Retention



For Grades Three to Five

National Council of Teachers of Mathematics Regional Conference

Minneapolis, Minnesota

November , 2015



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TEACHING AND LEARNING PLACE VALUE CONCEPTS
AND SKILLS

NCTM REGIONAL CONFERENCE

November, 2015

GRADE LEVEL: _____

1. What are the strengths your students demonstrate when learning about and using place value concepts and skills to solve problems and algorithms?
2. What are the challenges your students encounter when learning and using place value concepts and skills to solve problems and algorithms?
|
3. What concepts and skills would you prefer your students have when beginning their study or use of place value?
4. What instructional materials or resources would best assist you in teaching place value?

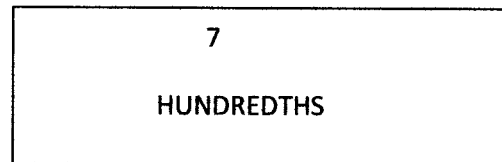
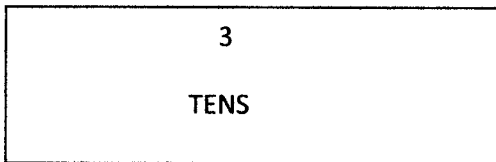
WHO IS IN THE RIGHT PLACE?

MATERIALS: Cards with whole or decimal names of places and numerals 0-9 for each place.

Whole Number version: one set of cards with digits 0-9 and 'ones' on for each digit, one set of cards with digits 0-9 and 'tens' for each digit, and so on as high a place value as wanted.

Decimal version: one set of cards has digits 0-9 and 'tenths' for each digit, one set of cards has digits 0-9 with 'hundredths' for each digit, on each, one set of cards has digits 0-9 with 'thousandths' for each digit, , and so on, as extended a place as wanted.

Examples:



DIRECTIONS: Students write any whole or decimal numeral with 3 or more digits. The leader announces a card from the stack created for the game. Students with the digit and place called circle that digit in their numeral. The winner is the student who has all the digits in all the places called. He/she announces, "Right Place."

Example: If a student with "342" announces "right place," he /she should have heard '3 in the hundreds place,' '4 in the tens place' and '2 in the ones place' called out by leader.

ROUNDS:

1. _____

2. _____

3. _____

Alternative, Developmental Algorithms

1. Addition: Partial Sums:

537	537
<u>+96</u>	<u>+96</u>
13	500
120	120
<u>500</u>	<u>13</u>
633	633

2. Subtraction: Left to Right:

$$\begin{array}{r}
 \overset{11}{672} \\
 -389 \\
 \hline
 300 \\
 \underline{290} \\
 83 \\
 \hline
 \mathbf{283}
 \end{array}$$

3. Multiplication: Partial Products

35	35
<u>x 47</u>	<u>x 47</u>
1200	35
200	210
210	200
<u>35</u>	<u>1200</u>
1645	1645

4. Division: Repeated Quotients

<u>164 r. 28</u>	
35)5768	100
<u>3500</u>	
2268	50
<u>1750</u>	
518	10
<u>350</u>	
168	4
<u>140</u>	
28	

Place Value Charts and Patterns to Develop Computation Concepts and Skills

H

T

O

(left to right) $835 - 768 =$

Ones

Tenths

Hths

$5.43 \times 3.2 =$ Note Pattern: tenths \times hundredths =

thousandths

H

T

O

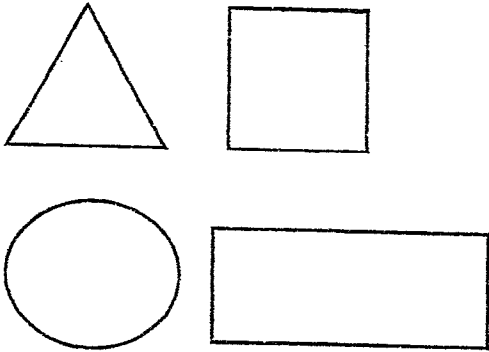
$345 \div 15 =$

$$\begin{array}{r}
 23 \\
 15 \overline{)345} \\
 \underline{30} \\
 315 \\
 \underline{75} \\
 240 \\
 \underline{150} \\
 90 \\
 \underline{90} \\
 0
 \end{array}$$

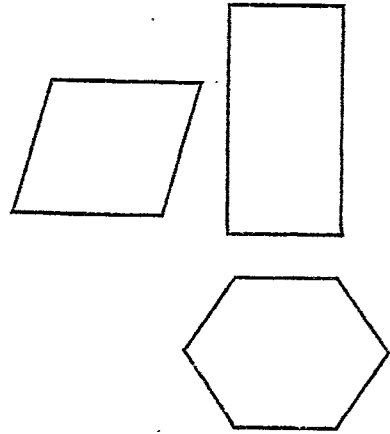
2 groups of 15
 5 groups of 15
 10 groups of 15
 6 groups of 15
 23 groups of 15
 subtracted from 345

TOSS TO WIN!

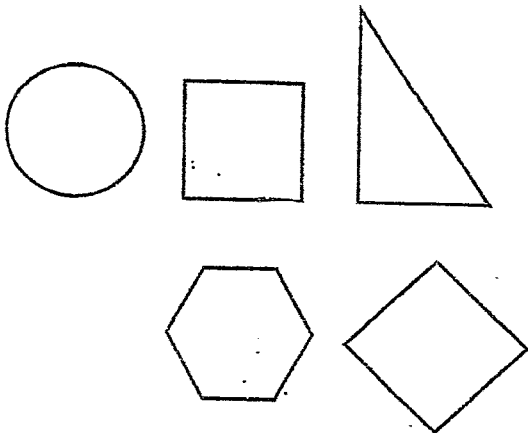
1.



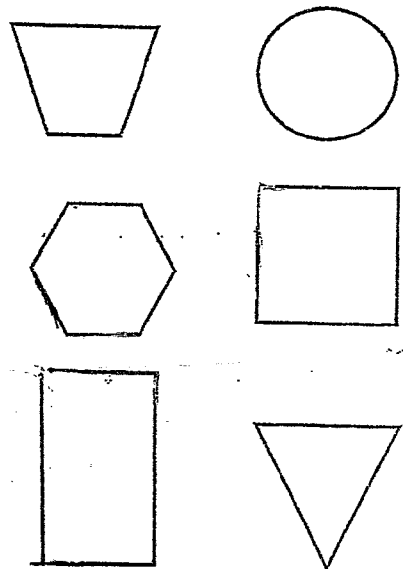
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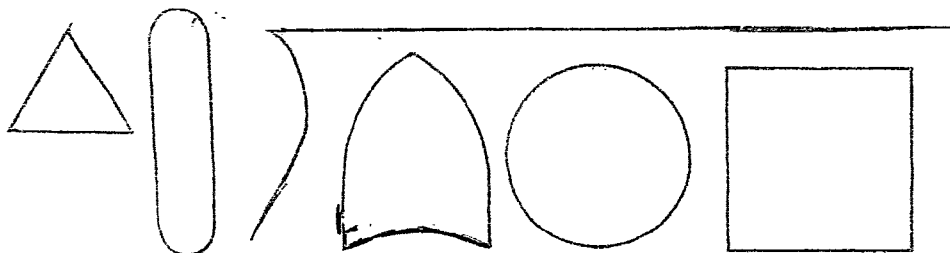
3.



4.



5



TOSS TO WIN GAMES

PURPOSE: Reinforce understanding of place value concepts and their relationship to accurate computation.

MATERIALS:

1. Game Sheets
2. Two number cubes. One is marked with "0," "1," "2," "3," "4," "5" and the second is marked with "5," "6," "7," "8," "9," "0."

DIRECTIONS:

1. The players decide which algorithmic pattern from the game sheet to play for the first round and if the pattern is to be computed by adding, subtracting, multiplying (for the whole numbers, where appropriate) and adding, subtracting, multiplying or dividing for the fraction games.
2. The players then decide, for the pattern chosen, if the goal for that computation should be the highest or lowest correct answer.
3. The leader chooses which number cube to use for the tossing and tells the players which numerals are on that cube.
4. The leader then tosses the cube and players write the revealed numeral in one of the shapes in the chosen pattern. Once the numeral is recorded, it cannot be moved or erased.
5. After a number is called for players to fill in all the shapes in the pattern, players compute their algorithm to determine who got the correct answer, according to the high or low choice. That player wins the round and can be the leader for the next game.

PLAY THE PLACE TO WIN

PURPOSE: Place value, estimation and mental mathematics practice

MATERIALS: Game sheet, number cubes with digits from 0-9

SIZE OF GROUP: 2 to the whole class

DIRECTIONS:

1. Players decide upon a target number.
2. First player rolls the number cube and all players record the digit in only one column. A "0" is then recorded in any column to the right of that number for that round.
3. Play continues as each player decides in which column to place the new rolled number until all rounds are played.
4. The winner is the player whose columns add up to but do not exceed the target number.
5. Any number of columns can be played.

Example: TARGET - 500

Rounds	HUNDREDS	TENS	ONES
1		3	0
2	2	0	0
3	1	0	0
4		4	0
5		6	0
6			9
Total	4	3	9

FILL 'ER UP!

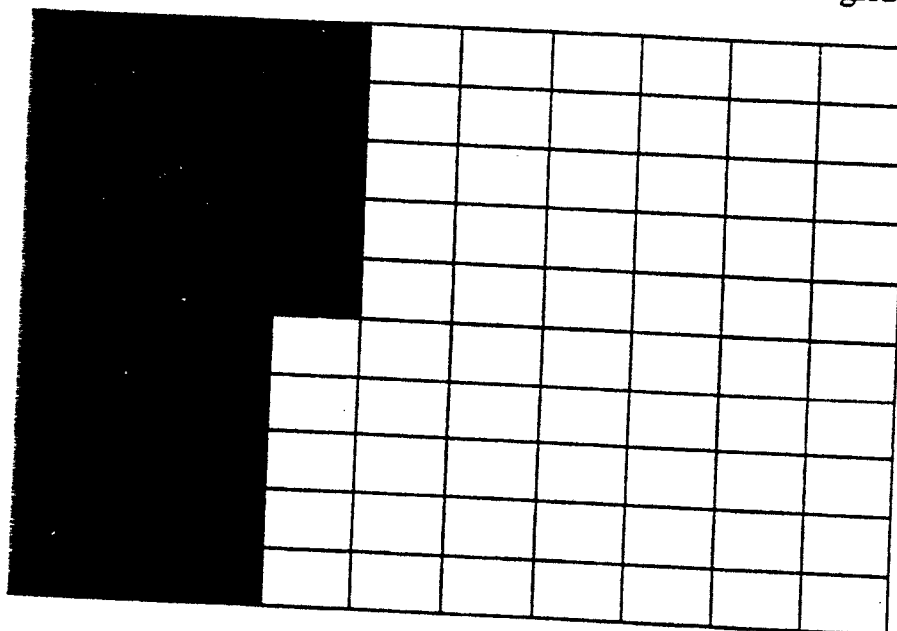
MATERIALS:

Grid of 100 squares
2 or 3 number cubes or 3 sets of cards numbered 1-9 (each set is a different color)

DIRECTIONS:

Each player has a grid. The object of the game is to fill the grid. Each person rolls the cubes or selects 3 cards. One cube (or set of cards) is red and representing tenths. One set of cards or a cube is green and represents hundredths. The third cube or set of cards is white and represents whole numbers.

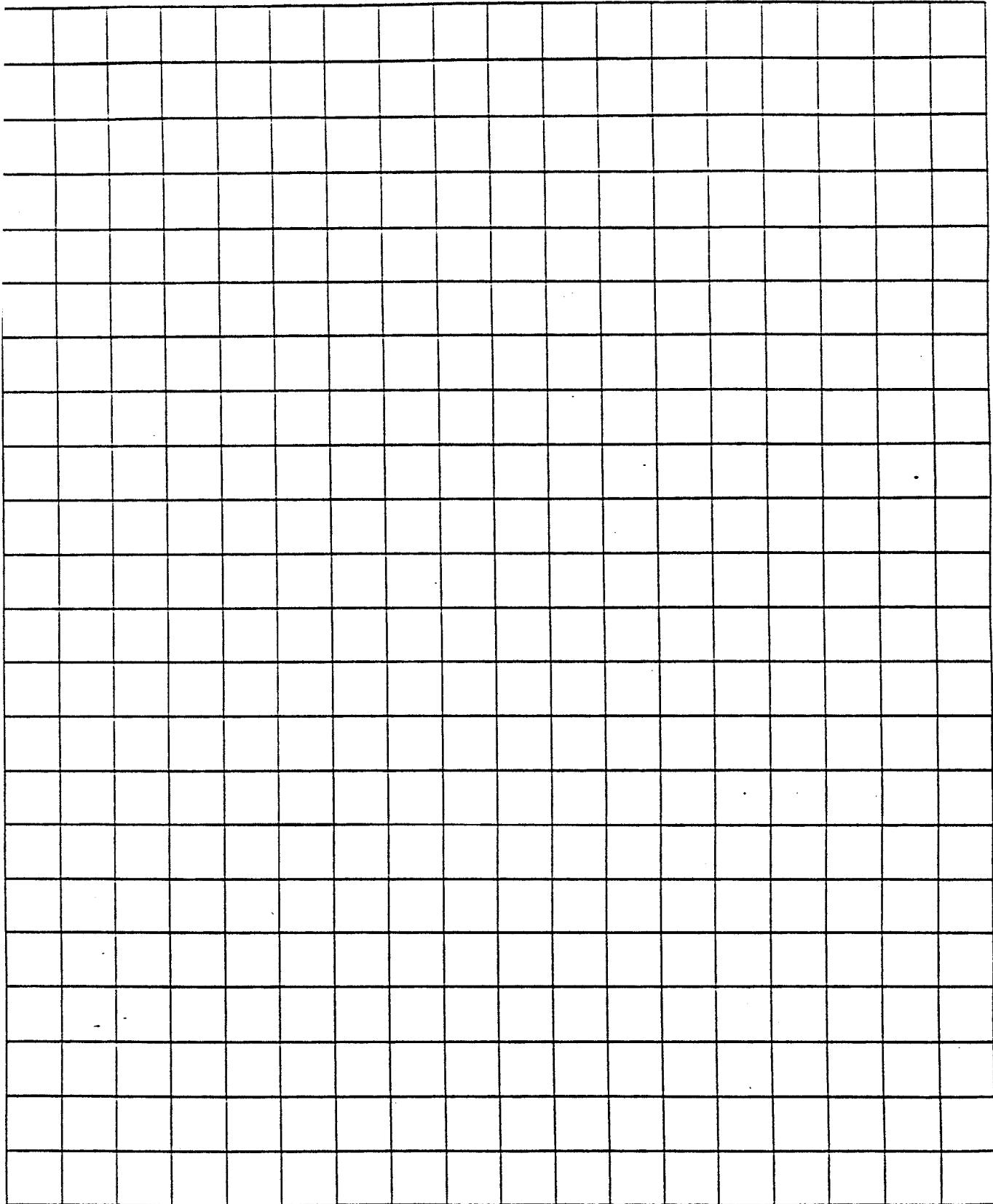
Easy Version: Pick a card from red and green stacks (or cubes) and fill in indicated stacks (or cubes) and fill in indicated amount. Example: 3 red, 4 green means fill in 3 tenths and 4 hundredths. Continue until grid is covered.



Computation Version: Pick from 3 different colors and multiply or divide result. Shade in answer. Example: Red 3, Green 7, White 4 -- Use 3 grids.

$$\begin{array}{r} .37 \\ \times 4 \\ \hline 1.48 \end{array} \leftarrow \text{Shade in--first to fill 3 grids wins.}$$

Grid Paper



PLENTY OF PLACES

Purpose: form the greatest whole number or decimal number from digits rolled from a number cube.

Materials: Paper, pencil, die

Directions: Each player draws a place value chart, either for decimals or whole numbers.. or one chart for each.

Each player hides his/her chart from other players and, in turn, rolls the die and records the numeral in any one of the places in the table. Once the number is placed , it cannot be moved. Play continues until each player has recorded a digit in each place of the table. The player with the greatest numeral, decimal or whole number, wins the round. The first player to win 5 rounds wins.

Whole number version:

1000 100 10 1

--	--	--	--

Decimal version:

100 10 1 .1 .01 .001

--	--	--	--	--	--

TARGET THAT NUMBER!

TOPIC: Decimals

PURPOSE: Determining decimal place value and addition of decimals

MATERIALS: Paper and pencil, 3 sets of cards, each numbered 0 - 9.

DIRECTIONS:

1. Draw a table as seen in the example.
2. Leader/teacher draws nine cards from a box of cards number 0-9.
3. Players record the numerals in any cell of the table they wish; they may skip 3 draws as the game progresses.
4. When all the boxes are filled, players place three decimal points anywhere in the boxes. Those three numbers are then added. The person with the closest sum to the target number wins the game.

EXAMPLE

BUILDING DECIMALS

PURPOSE: ESTIMATION OF DECIMAL QUANTITY, NUMBER SENSE

DIRECTIONS: BUILD DECIMALS FROM THE INFORMATION GIVEN IN EACH EXERCISE. SOME EXERCISES CAN HAVE MORE THAN ONE ANSWER.

1. GREATER THAN 600: _____ ● _____

2. LESS THAN 4: _____ ● _____

3. BETWEEN 4 AND 6 _____ ● _____

4. BETWEEN 200 AND 300: _____ ● _____

5. AS NEAR 205 AS POSSIBLE: _____ ● _____

6. LESS THAN 1: _____ ● _____

7. GREATER THAN 890: _____ ● _____

8. BETWEEN 50 AND 51: _____ ● _____