CCGPS Frameworks Student Edition

Mathematics

Second Grade Unit One
Extending Base Ten Understanding

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"Making Education Work for All Georgians"

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Unit 1: Extending Base Ten Understanding (7 – 8 Weeks)

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OVERVIEW

In this unit, students will:

- understand the value placed on the digits within a three-digit number
- recognize that a hundred is created from ten groups of ten
- use skip counting strategies to skip count by 5s, 10s, and 100s within 1,000
- represent numbers to 1,000 by using numbers, number names, and expanded form
- compare two-digit number using >, =, <

Students extend their understanding of the base-ten system by viewing 10 tens as forming a new unit called a hundred. This lays the groundwork for understanding the structure of the base-ten system. Students understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones).

The extension of place value also includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing. With skip counting, students begin to work towards multiplication when they skip by 5's, by 10's, and by 100's. This skip counting is not yet true multiplication because students don't keep track of the number of groups they have counted.

Representations such as manipulative materials, math drawings, and layered three-digit place value cards provide connections between written three-digit numbers and hundreds, tens, and ones. Numbers, number words, and expanded notation can be represented with drawings, place value cards, and by saying numbers aloud and in terms of their base-ten units, e.g. 456 is "four hundred fifty six" and "four hundreds five tens six ones."

Comparing magnitudes of two-digit numbers draws on the understanding that 1 ten is greater than any amount of ones represented by a one-digit number. Comparing magnitudes of three-digit numbers draws on the understanding that 1 hundred (the smallest three-digit number) is greater than any amount of tens and ones represented by a two-digit number. For this reason, three-digit numbers are compared by first inspecting the hundreds place (e.g. 845 > 799; 849 < 855).

PACING

As noted in the introduction to the Common Core State Standards, place value is one of the four critical areas for instruction in second grade. This first unit is lengthy, but as it is a critical area, a significant amount of instructional time should be dedicated to these concepts. Specifically, the Common Core suggests that understanding of base ten system "includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing. Students understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones)."

It is anticipated that completing each task as written will take approximately 7 – 8 weeks. Naturally, you will adjust the tasks meet the needs of your learners. As this unit is laying the foundation for second grade, plan on allotting a significant amount of instructional time.

NUMBER TALKS

Between 5 and 15 minutes each day should be dedicated to "*Number Talks*" in order to build students' mental math capabilities and reasoning skills. Sherry Parrish's book *Number Talks* provides examples of K-5 number talks. The following video clip from Math Solutions is an excellent example of a number talk in action. http://www.mathsolutions.com/videopage/videos/Final/Classroom_NumberTalk_Gr3.swf

During the Number Talk, the teacher is not the definitive authority. The teacher is the facilitator and is listening for and building on the students' natural mathematical thinking. The teacher writes a problem horizontally on the board in whole group or a small setting. The students mentally solve the problem and share with the whole group **how** they derived the answer. They must justify and defend their reasoning. The teacher simply records the students' thinking and poses extended questions to draw out deeper understanding for all.

The effectiveness of Numbers Talks depends on the routines and environment that is established by the teacher. Students must be given time to think quietly without pressure from their peers. To develop this, the teacher should establish a signal, other than a raised hand, of some sort to identify that one has a strategy to share. One way to do this is to place a finger on their chest indicating that they have one strategy to share. If they have two strategies to share, they place out two fingers on their chest and so on.

Number Talk problem possible student responses:

	Possible Strategy #1	**Possible Strategy #2**
29 + 8	29 can become 30 and take 1 from 8 reducing it to 7.	9 and 8 becomes 17 17 plus 20
54 + 86	50 + 80 + 10 =	Add 6 to 54 to get 60. Then 60 + 80 = 140

Number talks often have a focus strategy such as "making tens" or "compensation." Providing students with a string of related problems, allows students to apply a strategy from a previous problem to subsequent problems. Some units lend themselves well to certain Number Talk topics. For example, the place value unit may coordinate well with the Number Talk strategy of "making ten."

STANDARDS FOR MATHEMATICAL CONTENT

Understand Place Value

MCC2.NBT.1 Understand that the three digits of a three-digit number represent amounts of **hundreds, tens**, and **ones**; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones.

a. 100 can be thought of as a bundle of ten tens — called a ―hundred.
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MCC2.NBT.2 Count within 1000; skip-count by 5s, 10s, and 100s.

MCC2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

MCC2.NBT.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE

This section provides examples of learning experiences for this unit that support the development of the proficiencies described in the Standards for Mathematical Practice. The statements provided offer a few examples of connections between the Standards for Mathematical Practice and the Content Standards of this unit. The list is not exhaustive and will hopefully prompt further reflection and discussion.

1.	**Make sense of problems and persevere in solving them.** Students explain to themselves the meaning of a problem and look for ways to solve it. They may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They make conjectures about the solution and plan out a problem-solving approach.
2.	**Reason abstractly and quantitatively.** Students are linking concrete representations of quantity (such as base 10 blocks or groupable models) to a variety of abstract representations, such as expanded form and multiple numerical representations of hundreds, tens, and ones.
3.	**Construct viable arguments and critique the reasoning of others.** In this unit, teachers set the stage for students to be able to construct arguments, defend answers, and listen to the reasoning of others. Number Talks are an excellent way to set the stage for this.
4.	**Model with mathematics.** In second grade, students will represent numbers in word form, expanded form, standard form, and with base ten blocks. They will understand that all of these represent the same number. Further, students understand that there can be multiple ways to represent the same number (19 tens is equal to 190 or 1 hundred and 9 tens).

5.	**Use appropriate tools strategically.** Tools students use throughout this unit include number lines, hundreds charts, and base ten blocks. Students who use a number line *strategically* have progressed from counting by ones on a number line or hundreds chart to solving problems making leaps of tens. A further progression involves grouping tens and making leaps of 20, 30, or all the tens represented in a problem.
6.	**Attend to precision.** Students will use vocabulary precisely. They will also be able to discuss and represent a number in multiple ways.
7.	**Look for and make use of structure.** Students will look for patterns on a hundreds chart and use base ten blocks to make sense of numbers.
8.	**Look for and express regularity in repeated reasoning.** Students will develop reasoning strategies for comparing three digit numbers. When children have multiple opportunities to add and subtract "ten" and multiples of "ten" they notice the pattern and gain a better understanding of place value. Students continually check their work by asking themselves, "Does this make sense?"

*****Mathematical Practices 1 and 6 should be evident in EVERY lesson. *****

ENDURING UNDERSTANDINGS

- The value of a digit depends upon its place in a number.
- Numbers can be represented in many ways, such as with base ten blocks, words, pictures, number lines, and expanded form.
- Place value determines which numbers are larger or smaller than other numbers.

ESSENTIAL QUESTIONS

- Why should we understand place value?
- What is the difference between place and value?
- How does place value help us solve problems?
- How does the value of a digit change when its position in a number changes?
- What does "0" represent in a number?

CONCEPTS/SKILLS TO MAINTAIN

Skills from Grade 1:

- It is expected that students will have prior knowledge/experience related to the concepts and skills identified below. It may be necessary to pre-assess in order to determine if time needs to be spent on conceptual activities that help students develop a deeper understanding of these ideas. Developing understanding of whole number relationships and place value, including grouping in tens and ones;
- Developing understanding of addition, subtraction, and strategies for addition and subtraction within 20;

Second Grade Year Long Concepts:

- Organizing and graphing data as stated in MCC.MD.10 should be incorporated in activities throughout the year. Students should be able to draw a picture graph and a bar graph to represent a data set with up to four categories as well as solve simple put-together, take-apart, and compare problems using information presented in a bar graph.
- Routine topics such as counting, time, money, positional words, patterns, and tallying should be addressed on an ongoing basis throughout instructional time.

SELECTED TERMS AND SYMBOLS

The following terms and symbols are not an inclusive list and should not be taught in isolation. Instructors should pay particular attention to them and how their students are able to explain and apply them (**i.e. students should not be told to memorize these terms).**

Teachers should present these concepts to students with models and real life examples. Students should understand the concepts involved and be able to recognize and/or demonstrate them with words, models, pictures, or numbers.

For specific definitions, please reference the Common Core State Standards Glossary.

- **>, =, and <comparison**
- **digit**
- **expanded form**
- **models**
- **number line**
- **number names**
- **place value**
- **skip-count**
- **base ten model**
- **flat**
- **rod**
- **units**

STRATEGIES FOR TEACHING AND LEARNING

(Information adapted from Mathematics Common Core State Standards and Model Curriculum, Ohio Department of Education Teaching)

Place Value Instructional Strategies

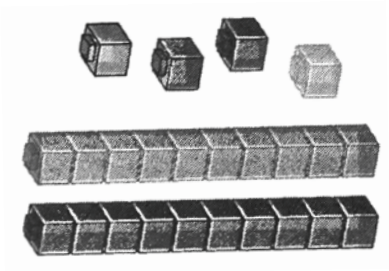
The understanding that 100 is equal to 10 groups of ten and 100 ones, is critical to understanding of place value. Using proportional models like base-ten blocks or bundles of tens along with place-value mats create connections between the physical and symbolic representations of a number and their magnitude. These models can build a stronger understanding when comparing two quantities and identifying the value of each place value position.

Van de Walle (p.127) notes that "the models that most clearly reflect the relationship of ones, tens, and hundreds are those for which the ten can actually be made or grouped from single pieces." Groupable base ten models can be made from beans and cups, bundled straws or craft sticks, unifix cubes, etc. If children are struggling with base ten blocks, you may consider using number cubes or inexpensive homemade manipulatives to help develop their understanding.

Groupable Base Ten Models

Bean Counters and Cups:
Ten single cups are placed in a portion cup. To make a hundreds put ten cups in a larger tub.

Bundles of Sticks:
Use craft sticks or coffee stirers. To make a hundred, put ten bundles into a larger bunch held together with a rubber band.



Cubes:
Ten single cubes form a bar of ten.
To make a hundred put ten bars on cardboard backing

Model three-digit numbers using base-ten blocks in multiple ways. For example, 236 can be 236 ones, or 23 tens and 6 ones, or 2 hundreds, 3 tens and 6 ones, or 20 tens and 36 ones. Use activities and games that have students match different representations of the same quantity. Provide games and other situations that allow students to practice skip-counting. Students can use nickels, dimes and dollar bills to skip count by 5, 10 and 100. Pictures of the coins and bills can be attached to models familiar to students: a nickel on a five-frame with 5 dots or pennies and a dime on a ten-frame with 10 dots or pennies.

On a number line, have students use a clothespin or marker to identify the number that is ten more than a given number or five more than a given number.

Have students create and compare all the three-digit numbers that can be made using digits from 0 to 9. For instance, using the numbers 1, 3, and 9, students will write the numbers 139, 193, 319, 391, 913 and 931. When students compare the digits in the hundreds place, they should conclude that the two numbers with 9 hundreds would be greater than the numbers showing 1 hundred or 3 hundreds. When two numbers have the same digit in the hundreds place, students need to compare their digits in the tens place to determine which number is larger.

Common Misconceptions with Place Value:
(Information adapted from Mathematics Navigator: Misconceptions and Errors, America's Choice)

Some students may not move beyond thinking of the number 358 as 300 ones plus 50 ones plus 8 ones to the concept of 8 singles, 5 bundles of 10 singles or tens, and 3 bundles of 10 tens or hundreds. Use base-ten blocks to model the collecting of 10 ones (singles) to make a ten (a rod) or 10 tens to make a hundred (a flat). It is important that students connect a group of 10 ones with the word *ten* and a group of 10 tens with the word *hundred.*

1. When counting tens and ones (or hundreds, tens, and ones), the student misapplies the procedure for counting on and treats tens and ones (or hundreds, tens, and ones) as separate numbers. When asked to count collections of bundled tens and ones such as 32, student counts 10, 20, 30, 1, 2, instead of 10, 20, 30, 31, 32.

2. The student has alternative conception of multi-digit numbers and sees them as numbers independent of place value. Student reads the number 32 as "thirty-two" and can count out 32 objects to demonstrate the value of the number, but when asked to write the number in expanded form, she writes "3 + 2." Student reads the number 32 as "thirty-two" and can count out 32 objects to demonstrate the value of the number, but when asked the value of the digits in the number, she responds that the values are "3" and "2."

3. The student recognizes simple multi-digit numbers, such as thirty (30) or 400 (four hundred), but she does not understand that the position of a digit determines its value. Student mistakes the numeral 306 for thirty-six. Student writes 4008 when asked to record four hundred eight.

4. The student misapplies the rule for reading numbers from left to right. Student reads 81 as eighteen. The teen numbers often cause this difficulty.

5. The student orders numbers based on the value of the digits, instead of place value. 69 > 102, because 6 and 9 are bigger than 1 and 2.

EVIDENCE OF LEARNING

By the conclusion of this unit, students should be able to demonstrate the following competencies:

- Use models, diagrams, and number sentences to represent numbers within 1,000.
- Write numbers in expanded form and standard form using words and numerals.
- Identify a digit's place and value when given a number within 1,000.
- Compare two 3-digit numbers with appropriate symbols (<, =, and >).
- Understand the difference between place and value.

TASKS

The following tasks represent the level of depth, rigor, and complexity expected of all second grade students. These tasks or tasks of similar depth and rigor should be used to demonstrate evidence of learning. It is important that all elements of a task be addressed throughout the learning process so that students understand what is expected of them. **Tasks marked with a * should become part of the regular classroom routine to help children develop a deep understanding of number sense and place value.**

Scaffolding Task	Tasks that build up to the learning task.
Learning Task	Constructing understanding through deep/rich contextualized problem solving tasks.
Practice Task	Tasks that provide students opportunities to practice skills and concepts.
Performance Task	Tasks which may be a formative or summative assessment that checks for student understanding/misunderstanding and or progress toward the standard/learning goals at different points during a unit of instruction.
Culminating Task	Designed to require students to use several concepts learned during the unit to answer a new or unique situation. Allows students to give evidence of their own understanding toward the mastery of the standard and requires them to extend their chain of mathematical reasoning.
Formative Assessment Lesson (FAL)	Lessons that support teachers in formative assessment which both reveal and develop students' understanding of key mathematical ideas and applications. These lessons enable teachers and students to monitor in more detail their progress towards the targets of the standards.

TASKS CONTINUED

Task Name	Task Type/ Grouping Strategy	Content Addressed	Content Standards
Look ahead to the FORMATIVE ASSESSMENT (FAL) listed in the table below. You may consider giving the FAL at the beginning of the unit as a pre-assessment. The official administration of the FAL takes place approximately 2/3 of the way through the unit.			
*Where Am I On the Number Line	**Scaffolding Task Partners**	Place Value Understanding	MCC2.NBT.1 MCC2.NBT.2 MCC2.NBT.3
*I Spy a Number	**Scaffolding Task Partners**	Place Value Understanding	MCC2.NBT.1 MCC2.NBT.3
Number Hop	**Constructing Task Small Group/ Individual**	Skip Counting	MCC2.NBT.2
Place Value Play	**Constructing Task Large Group**	Building 3 digit-Numbers	MCC2.NBT.1 MCC2.NBT.3 MCC2.NBT.4
The Importance of Zero	**Constructing Task Large Group**	Using Zero as a Digit	MCC2.NBT.1 MCC2.NBT.3
Base Ten Pictures	**Practice Task Large Group, Individual**	Represent numbers using models, diagrams, and number sentences	MCC2.NBT.1 MCC2.NBT.2 MCC2.NBT.3
Building Base Ten Numbers	**Constructing Task Partners or Individual**	Represent numbers using models, diagrams, and number sentences	MCC2.NBT.1 MCC2.NBT.3 MCC2.NBT.4
*What's My Number	**Constructing Task Small Group**	Represent numbers using models, diagrams, and number sentences	MCC2.NBT.1 MCC2.NBT.2 MCC2.NBT.3
Capture the Caterpillar	**Practice Task Small Group**	Represent numbers using models, diagrams, and number sentences	MCC2.NBT.1 MCC2.NBT.3 MCC2.NBT.4
FORMATIVE ASSESSMENT LESSON			MCC2.NBT.1
Fill the Bucket	**Practice Task Large Group, Partners**	Comparing Numbers	MCC2.NBT.1 MCC2.NBT.3 MCC2.NBT.4
High Roller	**Practice Task Small Group**	Comparing Numbers	MCC2.NBT.1 MCC2.NBT.3 MCC2.NBT.4
Place Value Breakdown	**Practice Task Partners**	Expanded Notation	MCC2.NBT.1 MCC2.NBT.3 MCC2.NBT.4
Carol's Numbers	**Culminating Task Individual**	Multiple Standards Addressed	MCC2.NBT.1 MCC2.NBT.2 MCC2.NBT.3 MCC2.NBT.4

***Incorporate into regular classroom routines**
If you would like further information about this unit, please view the Unit 1 Webinar on the Georgia DOE math wiki.

SCAFFOLDING TASK: Where am I on the Number Line?

Approximately 3 days (Adapted from: http://www.Mathwire.com)

In this task students will review counting up and counting back to get an answer. As the students play the games they will also see where a number lives on a number line and its relative position to other numbers.

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

a. 100 can be thought of as a bundle of ten tens — called a "hundred."
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MCC2.NBT.2 Count within 1000; skip-count by 5s, 10s, and 100s.

MCC2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

STANDARDS FOR MATHEMATICAL PRACTICE

Although all standards for mathematical practice should be applied regularly, this task lends itself to the standards below:

1. **Make sense of problems and persevere in solving them.**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
7. **Look for and make use of structure.**

BACKGROUND INFORMATION

(Information quoted from Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades K-3, pages 142-143)

"Relative magnitude refers to the size relationship one number has with another- is it much larger, much smaller, close or about the same? There are several quick activities that can be done with a number line sketched on the board. The number line can help children see how one number is related to another.

We should not permit children to study place-value concepts without encouraging them to see number in the world around them. You do not need a prescribed activity to bring real numbers in the classroom."

ESSENTIAL QUESTION

- How can place value help us locate a number on the number line?

MATERIALS

- Spinners, one per pair of students
- 0 – 100 student number lines
- 0 – 100 class number line made from adding machine tape or sentence strips
- Paper clips or clothes pins
- Empty number line set – One per student

GROUPING

Partners, Individual

NUMBER TALK

Strategy: Making 10
This strategy encourages students to "make 10" as they add mentally. "The sequence of problems within a given number talk allows students to apply strategies from previous problems to subsequent problems."

8 + 2 1 + 8 + 1 8 + 5 + 2 2 + 7 + 8

Please refer to pgs. 125-128 in *Number Talks* by Sherry Parrish for more examples of number talks that will further develop this strategy.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task students will review counting up and counting back to get an answer. As the students play the games they will also see where a number lives on a number line and its relative position to other numbers. Being able to locate a number on the number line (the relative position of numerals) is essential to developing solid number sense. It also helps students understand a number's value in relation to other numbers.

Part I
Introduce the game with the whole class before assigning partners to play. Using adding machine tape or sentence strips, create a large 0 -100 number line. Use this number line to introduce "Where Am I on the Number Line?"

Students will begin with their clothespin on "50" and then spin the spinner. Each time the spinner is spun, a student will move a paper clip or clothespin forward or back the appropriate number of spaces either up or down the number line. Have students give a number sentence that matches their move. The students will take turns adding to or subtracting from their number until

one player reaches or passes 100. This student is the winner. If they spin a number that is more than they can subtract they lose that turn. **When this happens make sure to discuss the fact that there ARE numbers on the other side of zero, negative numbers, but for now we are only working with/talking about the whole numbers.**

Example: The player's clothespin is on 23 and he spins a -6. He will move the clothespin back and tell the class, "23 – 6 = 17."

Student Directions

- Each player puts a paper clip or clothespin on **50**.
- Place a transparent spinner on the game spinner. (Use A and then B)
- Player A spins the spinner, adds or subtracts that number to **50** and places the paper clip on that answer.
- Player B spins the spinner and moves as above.
- Player A spins the spinner, adds or subtracts the number to where his/her paper clip is, then moves the paper clip to the new answer.
- Player B does the same.
- The game continues until one of the players **reaches or passes 100** on the number line. (Alternate version: Students could consider it a win when they reach/pass 0 **or** 100. The spinners are slightly weighted to favor passing 100. However, a student who has spun a lot of subtraction spins might get frustrated. S/he may remain engaged longer if reaching 0 also counted as a win. Further, one could easily adapt the spinner to balance it so either 0 or 100 is equally likely.)
- The first player to reach or pass 100 wins the game.

Part 2

Display a large number line and cover up most of the numbers. Select a mystery number and have a student place a marker where they think that number would lie on the number line. Check the location by uncovering the corresponding numbers.

Distribute **folded** empty number lines and paper clips to each student. Have students place their empty number line facing up with the corresponding number line on the back. The paper clip can be placed on the fold and used as a slider/marker. Call out a mystery number and encourage students to locate the number on their empty number lines with the paper clip. Students can then flip the number line over to check their answers. Discuss the correct location with the class.

****Corresponding Van de Walle activities can be found on pages 142 and 143 in *Teaching Student Centered Mathematics K-3*. These number line activities should be incorporated into daily classroom routines to help students learn the relative magnitude of numbers.**

- Activity 5.17 – "Who Am I?"
- Activity 5.18 – "Who Could They Be?"
- Activity 5.19 – "Close, Far, and in Between"

Part 3
Vary the games above by implementing skip counting by, 2's, 5's, and 10's into the number line activities. For example, after stating a number have students place a marker on the number that is 10 more. Continue counting by 10's until you reach the end of the number line. How do the numbers change? Do the students recognize a pattern?

Variation: *As the unit progresses, change the number lines to* ***show counts by 5's, 10's or 100's.*** *Using dice, each roll of the dice has to be changed into the corresponding multiple of that number. Example: If a student rolls a 3 on a 10's number line that roll will represent 30.*

FORMATIVE ASSESSMENT QUESTIONS

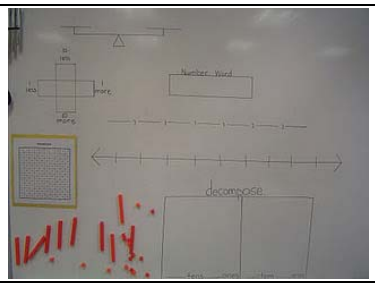
- If you are on the number _____, what number would you land on next if your spinner landed on _____?
- What number is 10 less than (10 more than, 5 less than, …)_____?
- What numbers are the next door neighbors of _____?

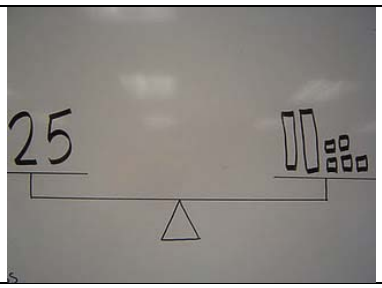
DIFFERENTIATION

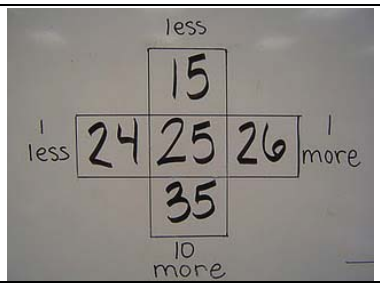
Extension
- Make a number line with only even or odd numbers so that students create a mental image of what the numeral's "neighbor" is on the number line.
- Have students evaluate the spinners in the Where Am I on the Number Line game. Ask students if it would be fair to say that passing either zero or 100 would be a fair way to play this game. (The spinners slightly favor 100.) Have students design a spinner that would make either score of 0 or 100 equally likely.

Intervention
- Reduce the number line to numerals less than 20 and use dice, either one or two depending on the level of the student. As the student becomes more proficient, the number line may be lengthened to include larger numbers.
- Use a spinner and/or number line with fewer numbers.

Additional Comments:
Number of the day activities should be incorporated throughout the year and become a regular classroom routine.

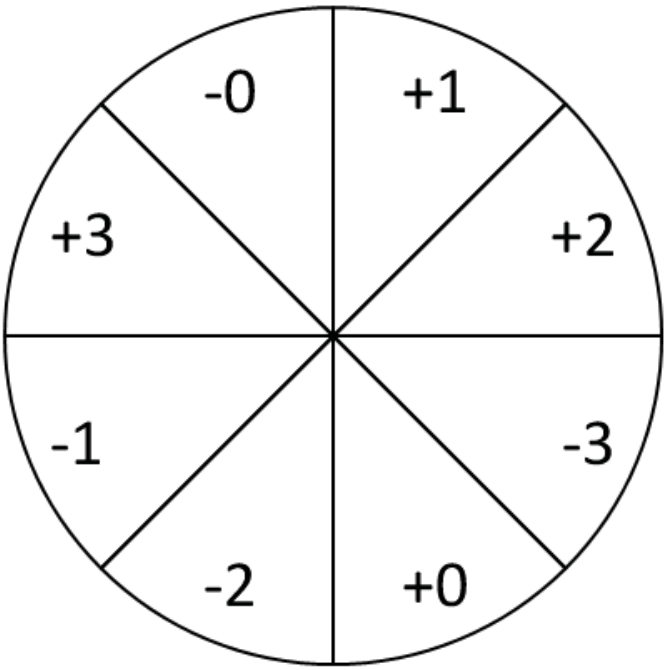






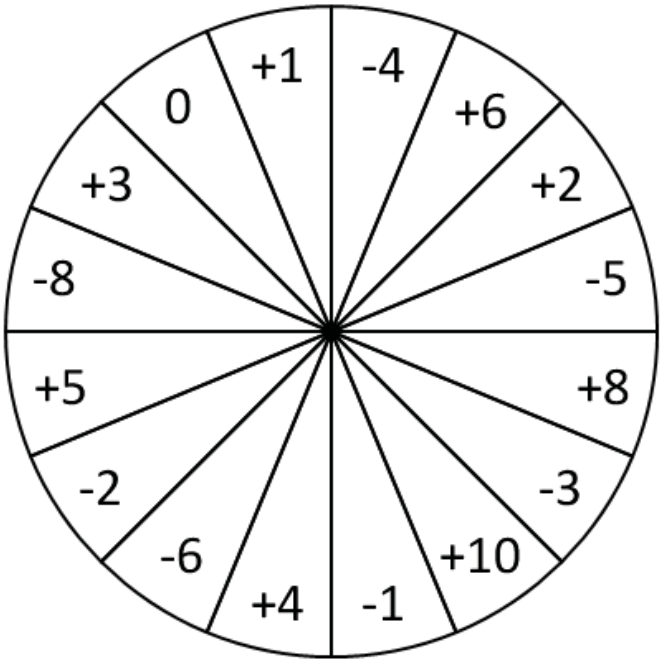
Spinner A – Where Am I on the Number Line?

Use this spinner if your number line is 25 or less.



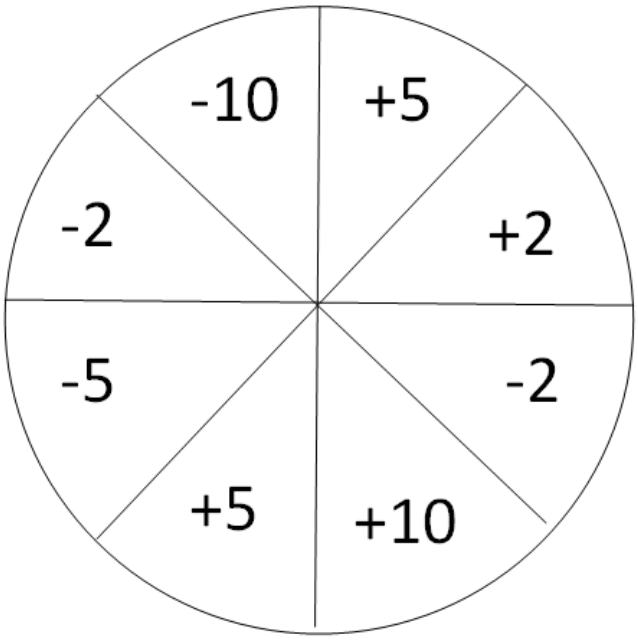
Spinner B – Where Am I on the Number Line?

Use this spinner if your number line is 0 – 100



Spinner C – Where Am I on the Number Line?

Use for skip counting



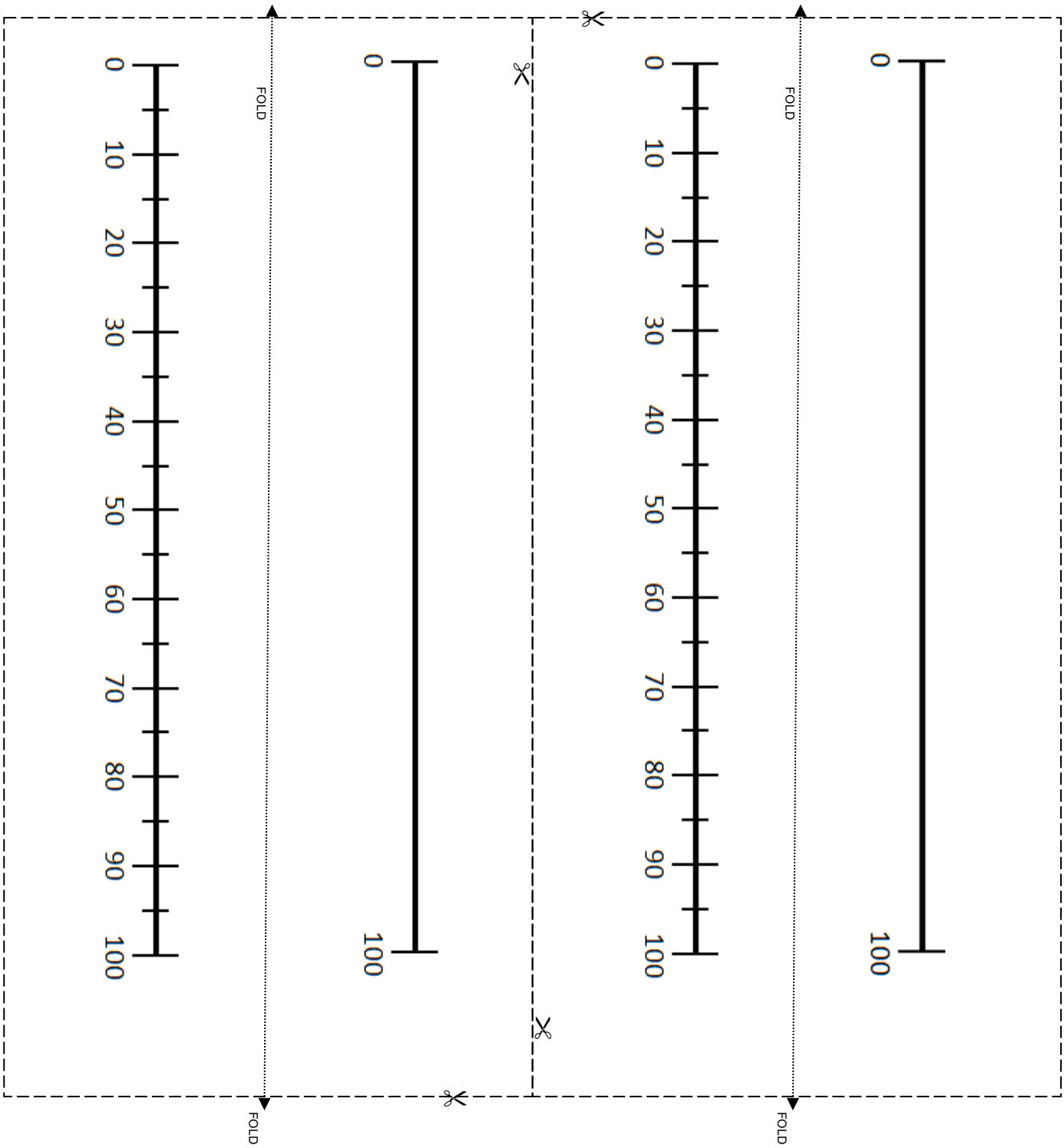
Student Number Line -Where Am I on the Number Line?

Students will cut these apart and glue together to make a 0 -100 number line.

0	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

Empty Number Line - Where Am I on the Number Line?

Cut out the number lines on the outer dotted line. Cut again down the center line and fold to make a front and back section for each student. Place a paperclip on the folded side to use as a slider/marker.



SCAFFOLDING TASK: I Spy a Number

Approximately 2 days

In this task, students will attempt to figure out a mystery number through reasoning.

STANDARDS FOR MATHEMITCAL CONTENT

MCC2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

a. 100 can be thought of as a bundle of ten tens — called a "hundred."
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MCC2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

STANDARDS FOR MATHEMATICAL PRACTICE

Although all standards for mathematical practice should be applied regularly, this task lends itself to the standards below:

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

BACKGROUND INFORMATION

(Information adapted from North Carolina DPI Instructional Support Tools)

There are patterns in the way that numbers are formed. Second graders continue to formally connect the ideas and patterns of groups of ten to our place value system of numeration.

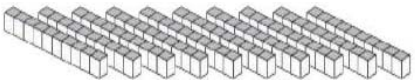
Our numerical system contains 10 digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. The value of these digits depends on its place.

This standard calls for students to:

- Work on decomposing numbers by place. Students should have ample experiences with concrete materials and pictorial representations examining numbers and understanding all numbers between 100 and 999 can be decomposed into hundreds, tens, and ones.

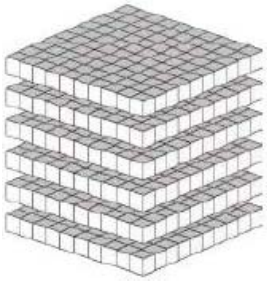
- Interpret the value of a digit (1-9 and 0) in a multi-digit numeral by its position within the number with models, words and numerals.

- Use 10 as a benchmark number to compose and decompose when adding and subtracting whole numbers. This standard calls for students to extend their work from 1st Grade by exploring a hundred as a unit (or bundle) of ten tens.



is the same as

Students should explore the idea that numbers such as 100, 200, 300, etc., are groups of hundreds that have no tens or ones. Students can represent this with place value (base 10) blocks.



6 hundreds are the same as 600

ESSENTIAL QUESTION

- How can we represent numbers using place value?

MATERIALS

- "I Spy a Number" Recording Sheet

GROUPING

Partners

NUMBER TALK

Strategy: Making 10
This strategy encourages students to “make 10” as they add mentally. “The sequence of problems within a given number talk allows students to apply strategies from previous problems to subsequent problems.”

3 + 7 2 + 7 + 1 7 + 5 + 3 3 + 7 + 7

Please refer to pgs. 125-128 in *Number Talks* by Sherry Parrish for more examples of number talks that will further develop this strategy.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

This is a game that should be introduced in this unit and become a regular classroom routine. The teacher can use an overhead projector to make a simple chart like this:

Guess	Digits Correct	Places Correct

Set a range for student guesses such as 100 to 999. However, the first few times you play, you may want to use a 2-digit number. You may also want to create a 0-9 number list on the board. Decide on a target number and write it in a place where you can keep it covered. For example, use the number **75**. Have a student guess the target number and record the guess in the first column. Are any digits in the guess correct? If not, put a "0" in both the "Digits Correct" and "Places Correct" columns. As you model the game, verbalize your own strategy, step by step, so that students who need to build reasoning skills can hear the processes that result in discovering the target number.

If any digits are correct, record how many digits and how many places are correct in the appropriate columns. Students will use deductive reasoning and knowledge of place value to find the target number. An example is shown below:

Guess	Digits Correct	Places Correct
12	0	0
36	0	0
45	1	1
73	1	1
98	0	0
75	2	2

The chart shows that none of the digits in 12 are in our target number. At this point, ask the students if there are any numbers on our 0-9 list they could eliminate. Hopefully, students will realize they could cross off 1 and 2. This may take some modeling.

0 ~~1~~ ~~2~~ 3 4 5 6 7 8 9

The next guess on the example is 36, fill out the Digits Correct and the Places Correct columns. Again, ask the students if there are any numbers on the 0-9 number list that we can cross off. The next guess of 45 is a wise guess because the digits 4 and 5 had not yet been used. Within the Digits Correct and Places Correct columns, place a one. Then ask the students if there are any numbers on our 0-9 number list that we can cross out. This is an opportunity for the students to have discourse on which digits they can eliminate. Ideally, you will get a student response similar to "We do not know if the 4 or the 5 is correct, so we can't cross out any of our numbers." The students have discovered that one digit and one place is correct. The task now is to find out if the 4 or the 5 is the digit to keep.

Next in the chart, 73 is a crucial guess because the students should already know that the target number has no three. Therefore, the correct digit must be the 7. You can show them how to keep track of this on their 0-9 number list by circling the 7.

Since the place is also correct, the number has to be seventy-something.
The table confirms that no digits in 98 are correct. So, the only remaining digits possible in the ones place of the target number are 4 and 5. We know 0 is not a consideration because the target number has only two digits and there is a 7 in the tens place and the chart shows us that either 4 or 5 in 45 is in the correct place, so there is nowhere for zero to go. We can eliminate the 4 because it is in the tens place and we already know there is a 7 in the tens place. Therefore, the five in forty-five must be correct because it is in the ones place. So, "seventy-something" is definitely 75.

As students become more comfortable with the game and with organizing their thought process, have them begin to play without keeping a 0-9 number list. This will cause them to begin to mentally reason with their guesses. Then proceed to move the students up to a three digit number, some students may need to use the 0-9 number list again to become comfortable with a larger number. At this point, using the correct word name will become important. Instruct students that guesses with incorrect word name will not be counted.

Even though this task yields one correct answer for the target number, it is important for you to see the thought processes and reasoning that students use in the game. Students should play this game many times before they are given the "I Spy a Number" Recording Sheet to play on their own or with a partner.

Students must have numerous experiences with the game as a large group before they can complete this task in small cooperative groups or with a partner. A clear understanding of place value names and values is also essential.

Game Directions

Students will follow the directions below from the "I Spy a Number" recording sheet.

1. This game should be played with a partner. Player one will choose a target number. The player will write it down secretly on the back of this paper and give player two a range of numbers from which to choose (Examples: between 0 and 99 or between 100 and 999).
2. Player two will then give his/her first guess. Player one will write the guess in the chart below and use the correct columns to write how many digits and the number of places that are correct. Use a zero to show that neither the digit nor the place value is correct.
3. After each guess, Player two should explain why each guess was made. Continue playing until the target number has been determined.
4. Then Player two will choose the target number and repeat the game.
5. Both players must explain the strategy for the guesses they make.

FORMATIVE ASSESSMENT QUESTIONS

- What are your strategies for determining the target number?
- How does knowing that the digit and/or the place value are correct help you figure out the target number?
- What can you conclude if your partner tells you that you didn't correctly guess the digit or the place value?
- How would you explain the best way to win this game to another student?
- What strategy do you think works best for finding the target number?
- Why did you choose this number?

DIFFERENTIATION

Extension

- Increase numbers to 4-digit numbers.

Intervention

- Use alternative chart to guide students in their next guess.
- Digits that are correct can be circled on the chart.

Alternative Chart:

Guess	Tens Digit	Ones Digit	Digits Correct

Guess	Tens Digit	Ones Digit	Digits Correct
47	1	0	1
53	0	0	1
45	1	1	2

Name _____ Date _____

I Spy a Number

Directions:

1. This game should be played with a partner. Player One will choose a target number. The player will write it down secretly on the back of this paper and give Player Two a range of numbers from which to choose (Examples: between 0 and 99 or between 100 and 999).

2. Player Two will then give his/her first guess. Player One will write the guess in the chart below and use the correct columns to write how many digits and the number of places that are correct. Use a zero to show that neither the digit nor the place value is correct.

3. After each guess, Player Two should explain why each guess was made. Continue playing until the target number has been determined.

4. Then Player Two will choose the target number and repeat the game.

5. Both players must explain the strategy for the guesses they make.

Guess	Digits Correct	Places Correct

Guess	Digits Correct	Places Correct

CONSTRUCTING TASK: Number Hop

Approximately 3 days

In this task, students practice skip counting by jumping. They then represent skip counting by making a model of their thinking.

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.2 Count within 1000; skip-count by 5s, 10s, and 100s.

STANDARDS FOR MATHEMATICAL PRACTICE

Although all standards for mathematical practice should be applied regularly, this task lends itself to the standards below:

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**

BACKGROUND KNOWLEDGE

(Information quoted from Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades K-3, pages 143-145)

"Children in the second grade should be thinking about numbers under 100 first, and, soon after, numbers up to 1,000. Quantities larger than that are difficult to think about. Where are numbers like this?"

"In our number system, some numbers are "nice." They are easy to think about and work with. What makes a nice number is sort of fuzzy. However, numbers such as 100, 500, and 750 are easier to use than 94, 517, and 762. Multiples of 100 are very nice, and multiples of 10 are not bad either. Multiples of 25 (50, 75, 425, 675, etc.) are nice because they combine into 100s and 50s rather easily, and we can mentally place those between multiples of 100s. Multiples of 5 are a little easier to work with than other numbers."

"A number line with nice numbers highlighted can be useful in helping children select neat nice numbers. A blank number line can be labeled in different ways to help students with near and nice numbers."
(Information adapted from North Carolina DPI Instructional Support Tools)

Second grade students should have experience working with a 99 chart. A 99 and/or Hundreds chart should be displayed prominently in the classroom environment. Skip counting skills may be quite difficult for children. As they become more comfortable with skip counts, you can challenge the students to skip count without the aid of the 99 or hundreds charts.

This standard calls for students to count within 1,000. This means that students are expected to count on from any number and say the next few numbers that come afterwards.

Example: What are the next 3 numbers after 498? 499, 500, 501

When you count back from 201, what are the first 3 numbers that you say? 200, 199, 198
This standard also introduces skip counting by 5s and 100s. Students are introduced to ten more or ten less in First Grade. When students add or subtract by 5s, the ones digit alternates between 5 and 0. When students add or subtracts by 100s, the hundreds digit is the only digit that changes, and it increases by one number.

It is important to vary the starting numbers so that students begin to understand the interesting and useful patterns in numbers. For example, do not always start with a multiple of ten when skip counting by 10's.

ESSENTIAL QUESTIONS

- How can we use skip counting to help us solve problems?
- What number patterns do I see when I use a number line?

MATERIALS

- 3 game surfaces out of chalk on a sidewalk, masking tape on a rug, etc.
- 0-99 chart (3 per student to highlight multiples)
- Highlighters
- "My Skip-Counting Recording Sheet" student task sheet
- Multiples written on index cards (1s, 2s, 5s, 10s)
- A recording board to record scores (example chalkboard, marker board, chart paper)
- Number Hop Assessment

GROUPING

Large Group, Small Group, Individual

NUMBER TALK

Strategy: Making 10
This strategy encourages students to "make 10" as they add mentally. "The sequence of problems within a given number talk allows students to apply strategies from previous problems to subsequent problems."

9 + 1 1 + 9 + 1 9 + 5 + 1 4 + 5 + 1

Please refer to pgs. 125-128 in *Number Talks* by Sherry Parrish for more examples of number talks that will further develop this strategy.

TASK DESCRIPTION, DISCUSSION, AND DEVELOPMENT

Prior to the lesson, create **3** game surfaces out of chalk on a sidewalk or masking tape on rug, or squares on the floor (see diagram on right.) Ten squares in a row for each game surface should be enough. Leave the inside of each square blank, but make the squares big enough for your students to jump in and out of easily.

Part I
Give each student the skip-counting recording sheets and a highlighter. Have students highlight the first chart showing the numbers said when you skip count by 2s. Using the class 99 chart, call upon students to highlight these numbers (Highlight numbers when skip counting by 2 and beginning at 0, 2, 4, 6, 8, 10 etc.) Discuss the patterns they see on the chart. Display this chart in the room. Do the same counting by 5s (starting at 0) – highlighting the multiples and discussing the pattern. Finally, do the same activity for the multiples of 10 (starting at 0) – highlighting the multiples and discussing the pattern.

Part II
Divide class into 3 groups each with their own game surface. Have students line up behind the game surface with their group. Each group will go one at a time and have to skip-count by a given number. Be sure to use a variety of starting numbers in addition to 0. Each child that is able to correctly skip-count through the entire game surface earns a point for their team (no matter how slowly they may need to go).

Record the points each group gets using tally marks. When a student reaches the end of the game surface counting correctly, let them try to jump the hopscotch backward using the same number to earn a bonus point for their team. For example, "Twenty, eighteen, sixteen, fourteen, twelve, ten, eight, six, four, two." It is much harder backwards, both jumping and counting, so allow them a reasonable amount of time. If this is the case, they may turn around and jump forward but count backward. After each round a different multiple is called, (1s, 2s, 5s, 10s) and the hopping and counting continues. Keep in mind, students will not be able to jump from 0 to 10; instead they say the multiple and jump one square for each new number until they've gone 10 jumps of whatever the multiple is.

Part III
This part of the task should be completed outdoors or in the gymnasium. In advance, the teacher should create enough game surfaces (20 to 30 squares each) so that students can work in small groups. (Upper grade students might be recruited to create these in advance as a service project)

Have a student volunteer roll a pair of large foam dice. This gives a two-digit starting number for the student to start from. Then ask the students how to skip-count (by 1s, 2s, 5s, or 10s) and the direction to skip-count (forward or backward). Allow students to create strategies to demonstrate their skip counting to their group.

Each child that is able to correctly skip-count through the entire game surface earns a point for their team (no matter how slowly they may need to go). Record the points each group gets using tally marks.

For example, if a student rolls a 4 and a 5, the starting number would be 9. The students would begin with the number nine and skip count by the designated pattern until they reach the end of the game board. (Skip Count by 10's: 9, 19, 29, 39, etc.).

Part IV
Give students a copy of the "Number Hop Assessment." Are the students able to connect their knowledge of number lines with their knowledge of skip counting?

After students have completed the "Number Hop Assessment", look over their work and consider which students have a solid understanding of how a number chart and a number line are connected and how they use a number line to skip count.

Part V
Ask each child to draw a number line for the numbers 0-20 (or an open number line, depending on what you have been using within your recent instruction). Then ask the students to show you how to skip-count by 2s on their number line. Monitor the students' work and then allow students to model their mathematics by sharing their number line with the class. Use this opportunity to allow the class to discuss their strategies. Repeat this process for the numbers 5 and 10 with a larger number line. This creates an opening to present open number lines. Model this same process with an open number line.

****Additional related materials for skip counting can be found on pages 138-139 in *Teaching Student Centered Mathematics* by Van de Walle. Skip counting skills show a readiness for multiplication.**

FORMATIVE ASSESSMENT QUESTIONS:

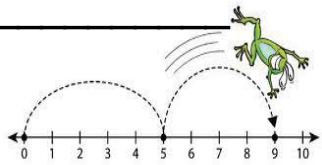
- How do you know what number to jump to next?
- How does skip counting help you solve problems?

DIFFERENTIATION

Extension
- Skip-count beyond 100 or skip-count by other increments such as 3s, 4s, etc.
- Count by 2s starting at an odd number

Intervention
- Provide students with a number line to help them skip-count.

Name:_____ **Date:**_____



Number Hop!

Lilly the Frog only hops by 10s. If she is on the number 20, how many hops will it take to land on the number 100?
Draw a picture to explain your answer.

How did you come up your answer?

_____

_____

_____

If Lilly the Frog hops by 5s, how many hops will it take to get to 75 if she starts on the number 40?
Draw a picture to explain your answer.

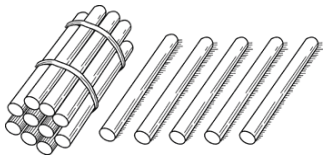
How did you come up your answer?

_____

_____

_____

CONSTRUCTING TASK: Place Value Play



Approximately 3 days

In this task students physically become tens and ones in order to better understand the base ten system. Students also build and compare 2 and 3-digit numbers using base ten materials (either block or a homemade system).

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

a. 100 can be thought of as a bundle of ten tens — called a "hundred."
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MCC2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

MCC2.NBT.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE

Although all standards for mathematical practice should be applied regularly, this task lends itself to the standards below:

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
6. Attend to precision.

BACKGROUND KNOWLEDGE

(Information adapted from North Carolina DPI Instructional Support Tools)

**This task is very similar to "Group It and Move It", a task found within First Grade, Unit 1.

Students should have had prior experiences and/or instruction with place value with ones and tens. This task will review and expand on this understanding by introducing larger numbers. Students should also have experience using base-ten blocks. While using base ten blocks, take the opportunity to discuss with your students the three forms in which a numeral can be displayed: using base-ten numerals (both standard form and modeling), number names, and expanded form. Incorporate this throughout the three parts of this task.

The questions in this task are designed to get them to talk about how many bundles it will take to make 100 and further, for example, how many bundles it will take to make 999. These questions

are also designed to help students understand how and why the digits 0-9 are used to represent a particular amount. Many students should already have an understanding of the bundling, but provide manipulatives, such as straws or sticks for students that need to physically move them. Make a connection to money at this point as it is a natural medium for students to use. Asking the question like, "If we thought about this place value mat in terms of money and we were building up to a dollar, what would be the place value positions represent?" Ones (pennies), tens (dimes) and hundreds (dollars). Listen for students to make the connection that 100 pennies equal a dollar and 10 dimes equal a dollar. Once it is clear that the students understand that it takes 10 groups of ten to make 100, then students are prepared to complete the next portion of the task.

This standard calls for students to read, write and represent a number of objects with a written numeral (number form or standard form). These representations can include place value (base 10) blocks, pictorial representations or other concrete materials. Please be cognizant that when reading and writing whole numbers, the word "and" should not be used. Example: 235 is written as "two hundred thirty-five." Non-example: 235 should **not** be written as "two hundred and thirty-five." However, when *describing* numbers, you may say, for example, 706 equals 7 hundreds, 0 tens, *and* 6 ones.

This standard builds on the work of **CCGPS.2.NBT.1** and **CCGPS.2.NBT.3** by having students compare two numbers by examining the amount of hundreds, tens and ones in each number. Students are introduced to the symbols greater than (>), less than (<) and equal to (=) in First Grade, and use them in Second Grade with numbers within 1,000. Students should have ample experiences communicating their comparisons in words before using only symbols in this standard.

Example: 452 __ 455

Student 1	**Student 2**
452 has 4 hundreds, 5 tens, 2 ones. 455 has 4 hundreds, 5 tens, 5 ones. They have the same number of hundreds and the same number of tens, but 455 has 5 ones and 452 only has 2 ones. 452 is less than 455. 452 < 455.	452 is less than 455. I know this because when I count up I say 452 before I say 455. 452 < 455.

The purpose of this part of the task is to get students discussing number comparison. **The focus is not to write number comparisons using >, =, or <. If you feel your students have a solid understanding of building and comparing numbers based on their magnitude, instead of on a rule taught to them, they may be ready to begin incorporating those symbols.

(Information quoted from Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades K-3, pages 37-38)

"The concepts of "more," "less," and "same" are basic relationships contributing to the overall concept of number. Children begin to develop these ideas before they begin school. An entering kindergarten child can almost always choose the set that is *more* if presented with two sets that are quite obviously different in number. Classroom activities should help children build on this basic notion and refine it.

Though the concept of less is logically equivalent to the concept of more (selecting the set with more is the same as *not* selecting the set with less), the word *less* proves to be more difficult for children than the word *more*. A possible explanation is that children have many opportunities to use the word *more* but have limited exposure to the word *less*. To help children with the concept of less, frequently pair it with the word *more* and make a conscious effort to ask "which is less?" questions as well as "which is more?" questions. For example, suppose that your class has correctly selected the set that has more from two that are given. Immediately follow with the question "Which is less?" In this way, the less familiar term and concept can be connected with the better-known idea.

For all three concepts (more, less, and same), children should construct sets using counters as well as make comparisons or choices between two given sets."

In comparing two numbers, it is also important to remember the magnitude of the number and to gain a better understanding of that, students can use a groupable model.

(Information quoted from Van de Walle and Lovin, Teaching Student-Centered Mathematics: Grades K-3, pages 127)

"Models that most clearly reflect the relationship of ones, tens, and hundreds are those for which the ten can actually be made or grouped from the singles. When children bundle 10 Popsicle sticks, the bundle of 10 literally is *the same as* the 10 ones from which it was made. Examples of these groupable models are shown in here. These could also be called "put-together-take-apart" models."

****<u>Models for Place Value</u> activities can be found on pages 127-132 of *Teaching Student Centered Mathematics K-3* by Van de Walle. Groupable and pre-grouped base-ten models are demonstrated in a variety of learning tasks.**

<u>ESSENTIAL QUESTIONS</u>

- What are different ways we can show or make (represent) a number?
- How do the values of digits change when their position in a number changes?
- What strategies help you to compare two numbers?
- How can changing the position of your digits change the magnitude of the number?

MATERIALS

- Base Ten Blocks (each pair needs at least 8 Hundreds, 20 Tens, and 10 Ones)
- Place Value Mat (an example is included)
- String, rope, or thin pieces of fabric in lengths that will go around a group of 10 students
- Dice

GROUPING

Large group and pairs

NUMBER TALK

Strategy: Making 10
This strategy encourages students to "make 10" as they add mentally. "The sequence of problems within a given number talk allows students to apply strategies from previous problems to subsequent problems."

5 + 5 5 + 6 + 5 4 + 1 + 4 + 1 9 + 5 + 5

Please refer to pgs. 125-128 in *Number Talks* by Sherry Parrish for more examples of number talks that will further develop this strategy.

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Part I
Create a large place value board on the floor (using butcher paper, masking tape, or you could even draw it on the sidewalk with chalk and play the game outside). Make sure that the area that you create for both the ones and tens columns can hold at least 9 students comfortably in each. With a large die, or a deck of cards with the numbers 1 – 9, roll/draw a number. Ask the class for volunteers and have that many students stand in the ones column.

Ask questions like:
- Why are you standing in the ones column?
- Is there room for any more students in your column?
- How many more students could join you in the ones column? What would happen if more than that number joined you?

Roll/draw another number. Ask for more volunteers and add that many more students to the ones area. The area might be getting a little more crowded now.

Ask questions like:
- How many students are now in the ones column?
- Do we now have enough students to make a group of ten? How do you know?
- What happens to the students that aren't linked with the group of ten?

If the group consists of ten or more, then have the tenth student link the arms of ten students, or "tie" them into a group of 10, and move to the tens place. If there are any extras, those students will remain in the ones column.

Ask questions like:

- Why have we moved this group to the tens place?
- What number is now represented on the place value board?
- Is that the same number as the number of children standing on the place value board?
- What digits do we use to write this number? Why do we use these particular digits? What do they stand for?

Continue with the game by rolling the die/drawing cards until all the students are standing on the board. Have students explain what is happening and why groups are moving.
***Encourage them to use the terms *place* and *value* as they are explaining the answers to the questions!**

Part II
After several rounds of the game have a class discussion:

- "How would this game change if we used all of the second grade students in our school?"
- "How would it change if we used all of the students in our school?"

Give student pairs a copy of a place value board and a baggie with at least 8 hundred blocks, 20 ten blocks, and 10 ones. Call out various 2 and 3 digit numbers and students should create these using their manipulatives. It is important for them to be able to use these manipulatives to model these 2 and 3 digit numbers, as well as explain what the digit 2 represents in the number 285, what the 8 represents and what the 5 represents. Using the base ten blocks helps students see and create what the number 285 means. Before students can understand how to combine 2 and 3 digit numbers, they must first be able to explain numbers in an expanded notion form, for example, 200+80+5. Once this understanding is established, they will use this knowledge as they expand their understanding of how numbers are combined.

Part III
After students have worked with a variety of 2 and 3 digit numbers, allow students to demonstrate their understanding of the base ten blocks**.** Have students work in pairs. Each student will roll a die three times (or roll three dice one time) and create a three digit number using base ten blocks and their place value mats. The two students will then compare the numbers that they have created and discuss their understanding. Students will begin to create strategies to build a larger number based on the place value of the digits. Foster those strategies and allow those students to share.

FORMATIVE ASSESSMENT QUESTIONS

- Why have we moved this group to the tens place?
- What number is now represented on the place value board?
- Is that the same number as the number of children standing on the place value board?
- What digits do we use to write this number? Why do we use these particular digits? What do they stand for?

Assessment Note: (Van de Walle pg. 131) "As you watch children doing these activities, you will be able to learn a lot about their base-ten concept development. For example, how do children count out the objects? Do they make groupings of 10 as they go? Do they count to 10 and then start again at 1? Children who do that are already using the base ten structure. But what you will more likely see early on is children counting a full set without any stopping at the tens and without any effort to group the materials in piles. A second-grade teacher had her students count a jar of small beans. After they had recorded the number, they were to ask for plastic cups in which to make cups of 10. Several children, when asked how many cups they thought they might need, had no idea or made random guesses."

DIFFERENTIATION

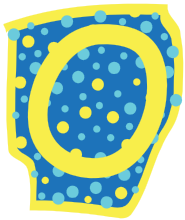
Extension

- Have students represent 3-digit numbers with expanded notation. (Note: All students will be responsible for representing 3-digit numbers by the end of this unit.)
- Extend the place value chart to the one thousands.

Intervention

- Provide students with a ten-frame to help them recognize when to group items to move to the next column.
- Complete "Group It and Move It" only using numbers in the ones and tens place.

Hundreds	Tens	Ones



CONSTRUCTING TASK: The Importance of Zero

Approximately 1 day (Adapted from Gourmet Curriculum Press, Inc.)

In this task, students evaluate the importance of zero in building numbers in a base ten system. They represent numbers 3-digit numbers including 0 in multiple ways.

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

a. 100 can be thought of as a bundle of ten tens — called a "hundred."
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MCC2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

STANDARDS FOR MATHEMATICAL PRACTICE

Although all standards for mathematical practice should be applied regularly, this task lends itself to the standards below:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

According to Van de Walle, as children progress to 3-digit numbers, difficulties may arise when students are represented with numbers that contain zeros. This is especially evident when students write numbers involving no tens. For example, a child may write 7002 for "seven hundred two." Understanding the meaning of numbers in the oral base-ten language is a prerequisite skill for writing numbers.

The arrow cards provided create numbers up to 9,999, however, students in the second grade are only reading and writing numbers within 1,000. Use the higher numbers as an extension for students that are ready to move onto higher numbers.

Students should have had prior experiences and/or instruction with place value with ones and tens. This task will review and expand on this understanding by introducing larger numbers. Students should also have experience using base-ten blocks. While using base ten blocks, use the opportunity to discuss with your students the three forms in which a numeral can be displayed: using base-ten numerals (both standard form and modeling), number names, and expanded form. Incorporate this throughout the three parts of this task.

ESSENTIAL QUESTIONS

- Why should we understand place value?
- What is the difference between place and value?
- What happens if I add one to the number 9? The number 19? The number 99? The number 109? Etc.
- What does "0" represent in a number?

MATERIALS

- 4 envelopes with flaps folded back, or library pockets, each labeled with the place value ones, tens, hundreds, and thousands (for each group)
- 4 sets of place value number index cards 0 – 9 with numbers on the top of each strip (for each group)
- Set of stackable expanded notation arrow cards (for each group)
- Suggested Book: *A Place for Zero* by Angeline LoPresti (optional)

GROUPING

Whole Group/small group

NUMBER TALK

Strategy: Making 10
This strategy encourages students to "make 10" as they add mentally. "The sequence of problems within a given number talk allows students to apply strategies from previous problems to subsequent problems."

4 + 2 + 6 7 + 3 + 5 2 + 6 + 8 9 + 7 + 1

Please refer to pgs. 125-128 in *Number Talks* by Sherry Parrish for more examples of number talks that will further develop this strategy.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I
Before task is implemented, have four envelopes labeled thousands, hundreds, tens, and ones on the pockets. Prepare four sets of place value index cards 0- 9 with the numbers written on top of each card. (Make sure number is visible above pocket.) Optional: Read "A Place for Zero."

1. Place a digit in the ones pocket. Have the students discuss what this number represents. (The number can be represented with base ten manipulatives as the number is discussed.)
2. Continue to add one to this digit until you reach 10. Ask: What happens if we add one to the number 9?
3. Repeat this process to discuss what happens after numbers like 19, 99, 109, 199. Etc.

4. With each situation, discuss what the "0" represents. Why is the "0" important? Also demonstrate what each digit is worth when it is placed in various pockets. Discuss that a 4 in the hundreds pocket is worth 400 while a 4 in the tens pocket is worth 40.
5. Create them with the stackable place value cards and write the expanded form of the numbers as you create them **or** discuss what happens if a "0" is used as a digit. (Ex. 207 = 200 + 7.) What is the importance of zero?

Part II
Working in groups of four, students will create the base-ten number, number names, arrow cards, and expanded form. Each student in the group will do each job at least once. Use the attached "Math Mambo" card and assign each student a starting place. Then turn the card one place to the right and start over with a new number. Have students record their work within their math journals or on a piece of paper.

- The student assigned "choose the number" will create a three digit number using the 0-9 number cards. This number **must include a 0** and will be used by all four students to fulfill their number form.
- The student assigned "Number in Words" will write the number name of the number. This student will write out the number in word form. This should be written both as "three hundred fifty-seven" and "three hundreds, five tens, seven ones."
- The third student will be assigned "expanded form." This student will create the number in an expanded form addition sentence.
- The fourth student builds the number with the arrow cards.

Once every student has completed their job, the jobs rotate and the next student with the "base-ten number" job must move the 0 to a different place value position. Rotate these until each student has performed every job at least once, each time recording their work within their math journals or on a sheet of paper.

FORMATIVE ASSESSMENT QUESTIONS

- What is the importance of zero?
- What is the difference between place and value?
- How can you show me this number in expanded form? in words? in standard form?

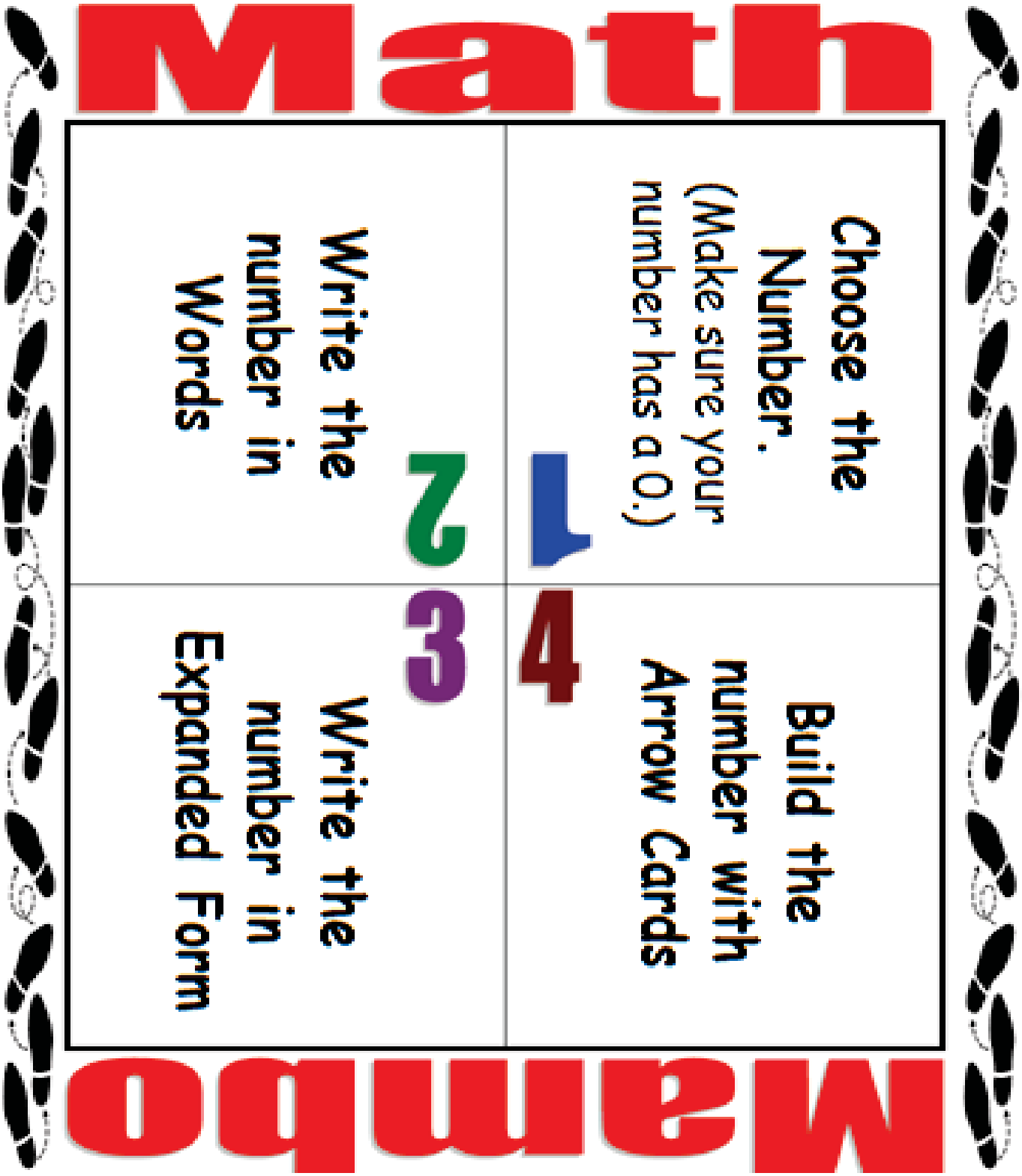
Corresponding activities can be found in *Teaching Student Centered Mathematics Grades K-3* by Van de Walle. (pg. 140)

- Activity 5.14 - "Say It/Press It"
- Activity 5.15 - "Show It/Press It"

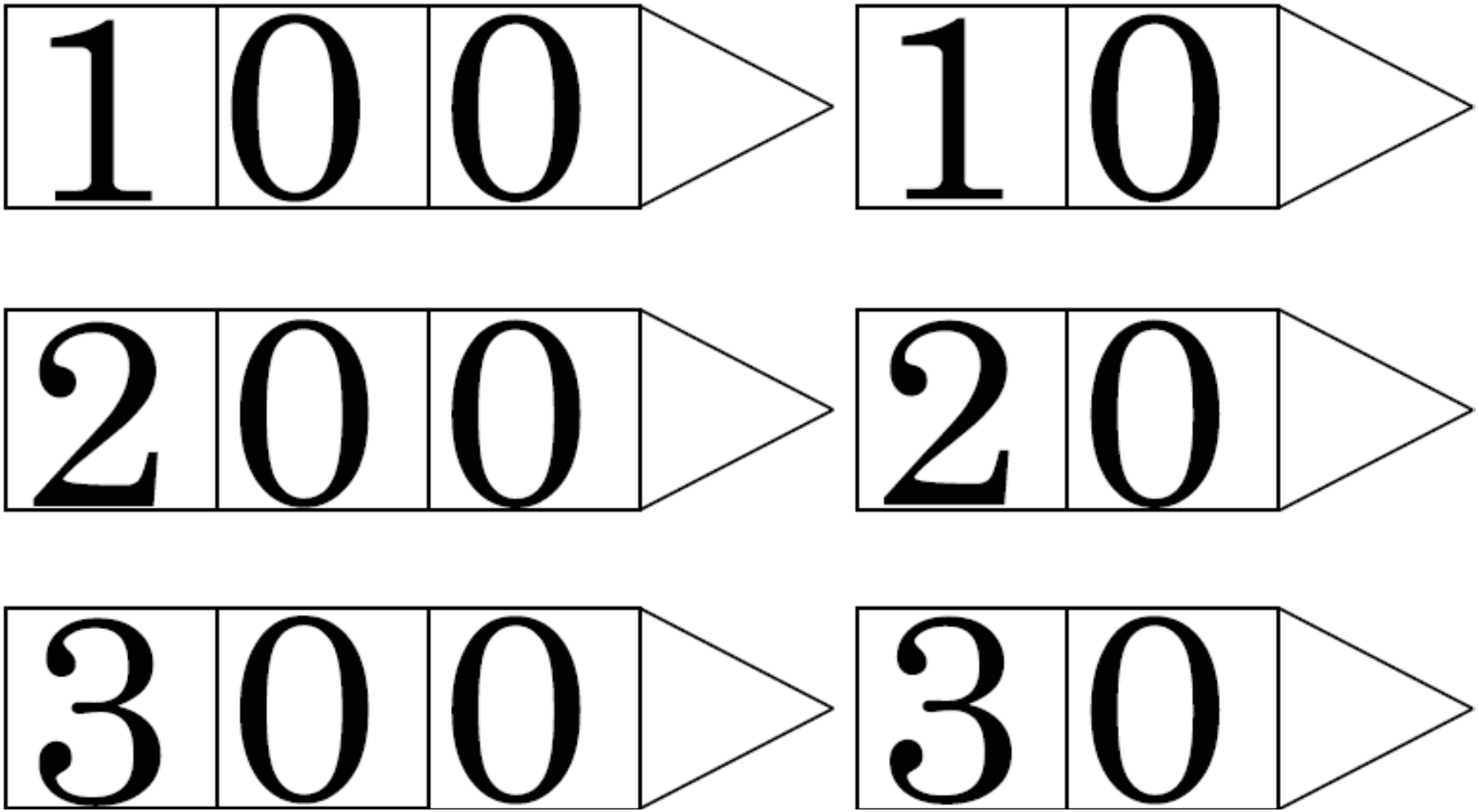
DIFFERENTIATION

Extension
- Build 4 digit numbers

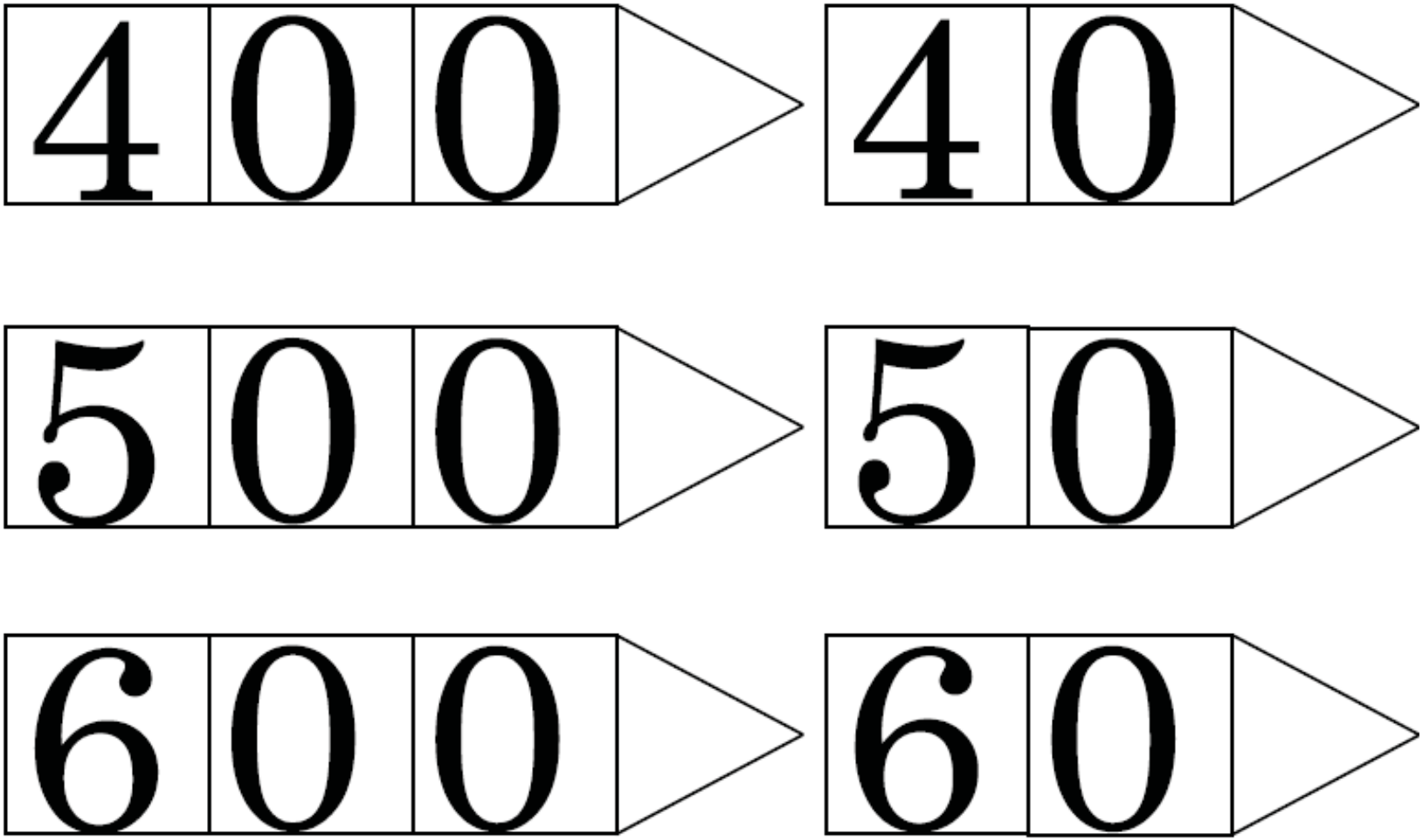
Intervention
- Say the number name for a number with either two or three digits.
- Allow students to use their own base ten models to show that number and press it on a calculator (or write it). Pay special attention to the teens and the case of zero tens.



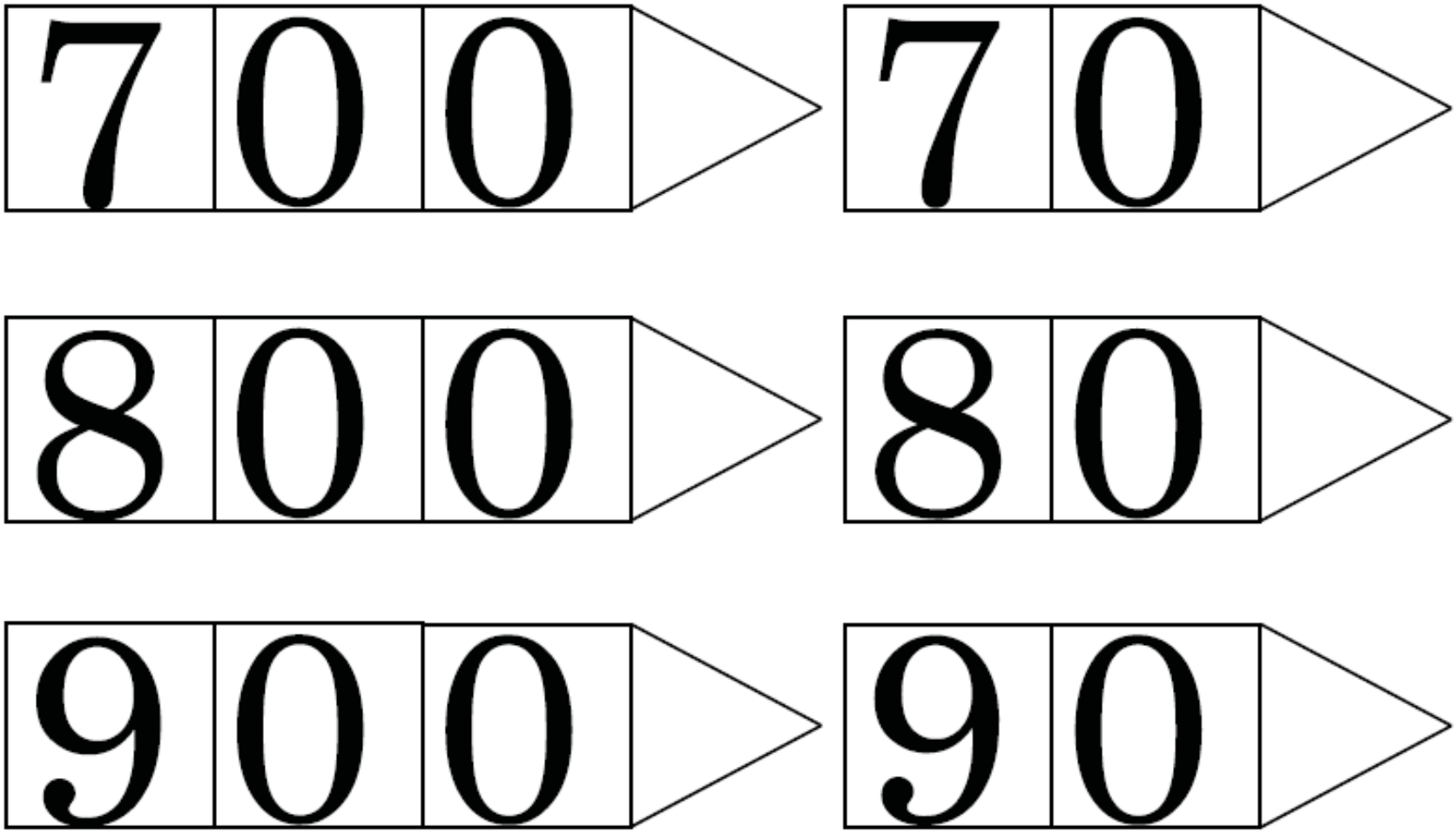
Adapted from Dan Mulligan



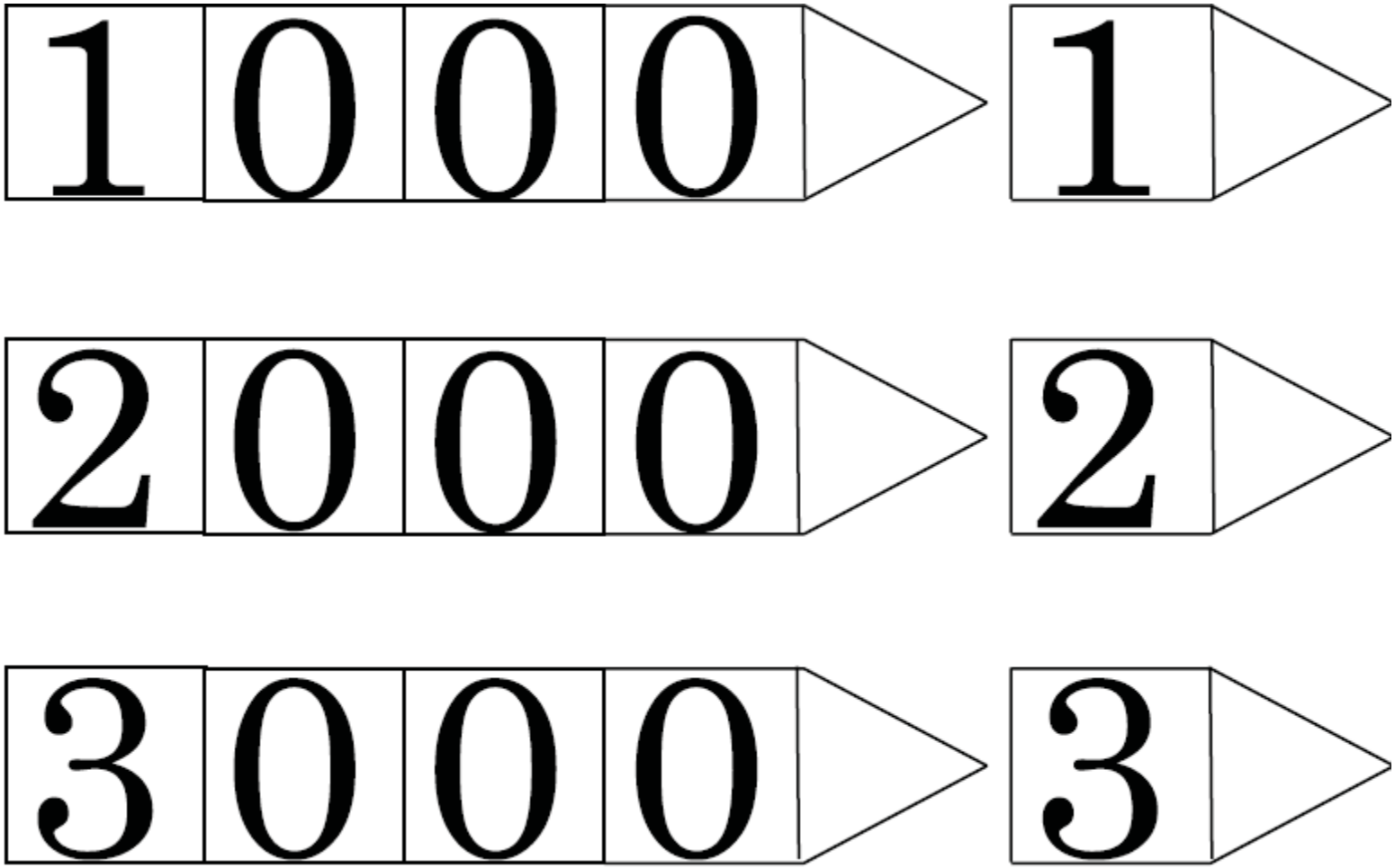
(Arrow cards taken from Numeracy Development Project Material Masters 4-14, NZ Maths)



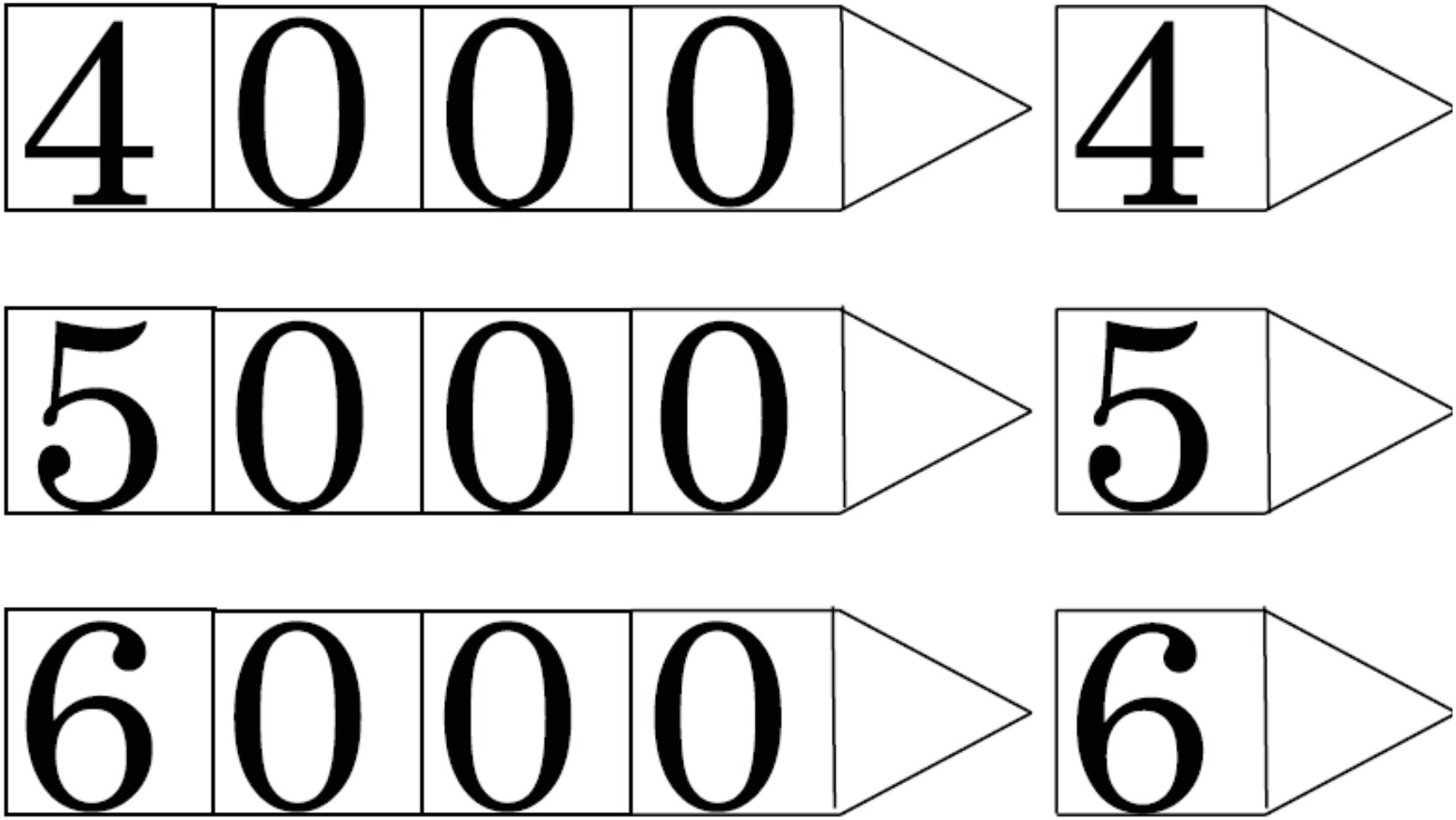
(Arrow cards taken from Numeracy Development Project Material Masters 4-14, NZ Maths)



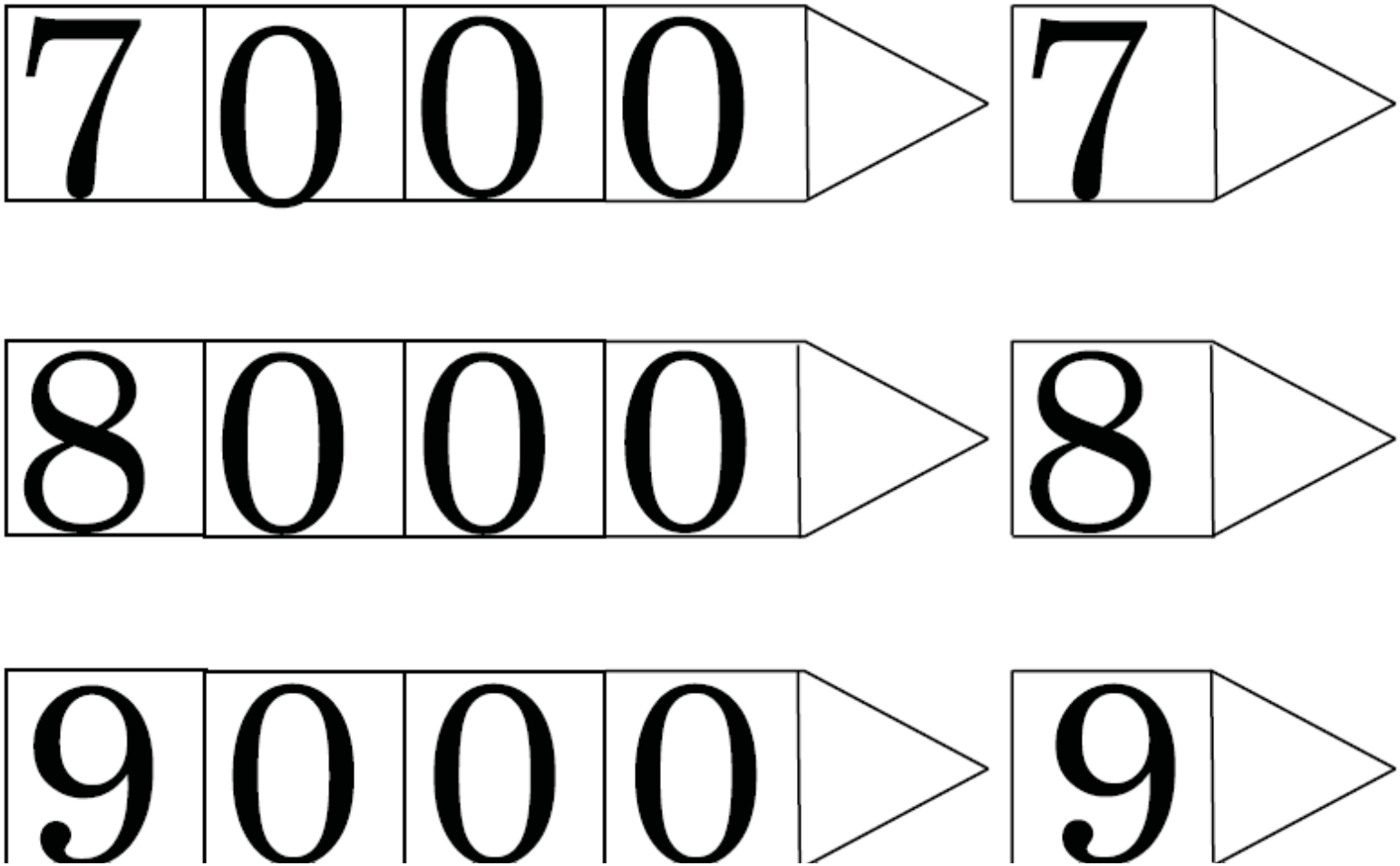
(Arrow cards taken from Numeracy Development Project Material Masters 4-14, NZ Maths)



(Arrow cards taken from Numeracy Development Project Material Masters 4-14, NZ Maths)

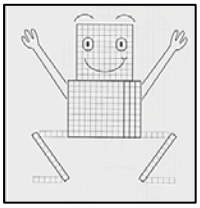


(Arrow cards taken from Numeracy Development Project Material Masters 4-14, NZ Maths)



(Arrow cards taken from Numeracy Development Project Material Masters 4-14, NZ Maths)

PRACTICE TASK: Base Ten Pictures



Approximately 1– 2 Days (Adapted from *Understanding Numbers: Place Value* by Kathy Richardson – Math Perspectives p. 22, 23.)

In this task, students create pictures using base ten blocks. They then record base ten information about their creations.

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

a. 100 can be thought of as a bundle of ten tens — called a "hundred."
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MCC2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

STANDARDS FOR MATHEMATICAL PRACTICE

Although all standards for mathematical practice should be applied regularly, this task lends itself to the standards below:

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
6. Attend to precision.

BACKGROUND KNOWLEDGE

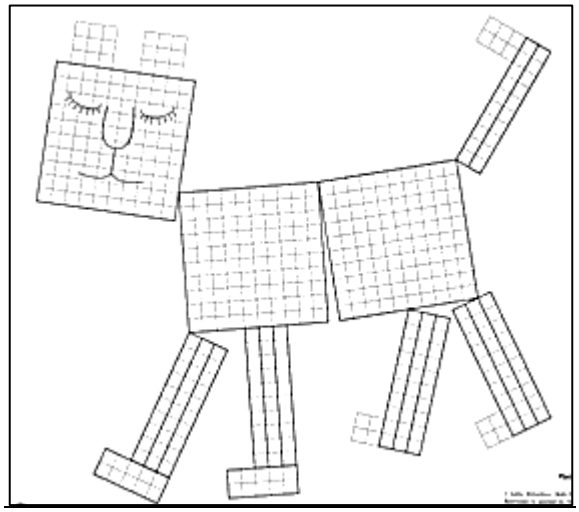
This task provides an interesting way for students to work with groups of hundreds, tens, and ones. This activity will create a fun interactive way for students to explore how numbers are composed. This will also give students the opportunity to discover how you write a number that is composed of two tens and eleven ones. Foster the discussion with students on regrouping and what that means for ones, tens, and hundreds.

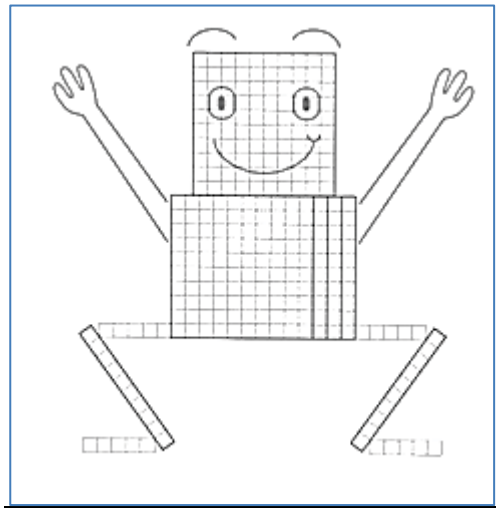
ESSENTIAL QUESTIONS

- Why should we understand place value?
- What are the different ways we can show or make (represent) a number?
- What is the difference between place and value?
- How can we determine how many tens are in a number?

MATERIALS

- Centimeter graph paper or base-10 patterns
  http://www.etacuisenaire.com/pdf/gridpaper.pdf
  http://www.ablongman.com/vandewalleseries/Vol_1_BLM_PDFs/BLM19.pdf





GROUPING

Large Group, Individual

NUMBER TALK

Strategy: Making 10
This strategy encourages students to "make 10" as they add mentally. "The sequence of problems within a given number talk allows students to apply strategies from previous problems to subsequent problems."

7 + 3 + 8 + 2 8 + 7 + 3 + 2 5 + 6 + 4 + 5 9 + 1 + 1 + 9

Please refer to pgs. 125-128 in *Number Talks* by Sherry Parrish for more examples of number talks that will further develop this strategy.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I

1. Provide students with centimeter graph paper. Have students trace the hundreds blocks and tens strips on the graph paper first to be sure they are marking the correct amount of squares. Encourage the children to label each part with its value.
2. Have the students create a base ten picture of their own using the pieces they made and reorganize/combine them to make new pictures.

3. Provide students with "My Base Ten Picture" recording sheet. Students should record the number of blocks used to make their design in standard and expanded form as well as discuss the difference between place and value.
4. Have students exchange with a partner to determine the value of each picture they make. Encourage them to be creative!

PART II

1. Have the students state the type of animal they created and how that animal travels (runs, swims, flies, etc.). Write this information on the board and create a table for the way the animals travel, placing tally marks under each one.
2. Encourage the students to create/draw a bar graph with the information from the board.
3. Have students create at least three questions about their graph and the correct answer.
4. Discuss the data and ask relevant questions such as "How many more animals fly than walk?"

FORMATIVE ASSESMENT QUESTIONS

- How many blocks did you use to create your animal?
- How did you count the number of blocks?
- How many blocks did your partner use?
- Who used the most blocks?
- How could you create an animal to make it easiest to count?
- How did you count the total number used?
- Can you show me this number in standard form?
- What is the number in expanded form?

DIFFERENTIATION

Extension

- Have the students determine the money amounts of each of the pieces and then determine how much their picture costs.

Intervention

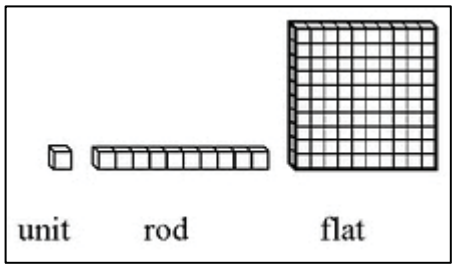
- Provide sample pictures that the student can recreate with real base ten blocks. The picture can then be labeled with the correct values and then created with centimeter paper.

Name:_____ Date:_____

Base-Ten Picture Recording Sheet

I made a _____.
(name animal)

My design was built with _____ base ten blocks.
(write number)



I used ____ flats, ____ rods/longs, and ____ units.

My number has _____ digits.

Here is my number in expanded form.

_____
(hundreds + tens + ones)

I can represent and show numbers using different models, pictures, or number sentences.

My work shows I understand the value of each digit in my number.

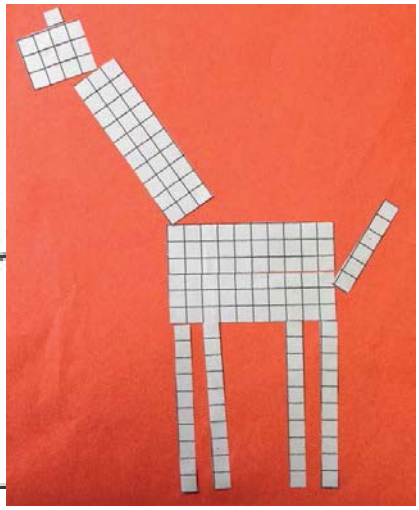
What is the difference between place and value?

_____

_____

_____

_____



Georgia Department of Education
Common Core Georgia Performance Standards Framework
Second Grade Mathematics • Unit 1

Base-Ten Picture Recording Sh

Name: _____

I made a Giraf
(name animal)

My design was built with 149 base ten blocks.
(write number)

My number has 3 digits.

Here is my number in expanded form.
100 + 40 + 9 = = 149
(hundreds + tens + ones)

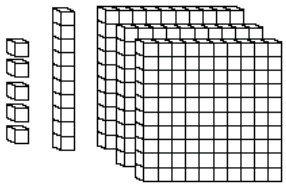
I can represent and show numbers using different models, pictures, or number sentences.

My work shows I understand the value of each digit in my number.

What is the difference between place and value?
The place is hudreds, tens, ones.
The value is how much each digit is worth.

CONSTRUCTING TASK: Building Base-Ten Numbers

Approximately 2 Days



In this task, students build the largest and smallest possible numbers with 3 digits. They then compare the numbers they created.

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

a. 100 can be thought of as a bundle of ten tens — called a "hundred."
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MCC2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

MCC2.NBT.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE

Although all standards for mathematical practice should be applied regularly, this task lends itself to the standards below:

1. Make sense of problems and persevere in solving them.
4. Model with mathematics.
6. Attend to precision.
7. Look for and make use of structure.

BACKGROUND KNOWLEDGE

Students need to understand how to order digits from largest to smallest and vice versa. They also need to understand place value concepts and how they relate to the base ten pieces. Sufficient experience with pre-grouped base ten models should precede this activity. A dot, stick, and square can be used when recording ones, tens, and hundreds. (This model is shown on page 134 of Teaching Student-Centered Mathematics: Grade K-3, page 134).

Because there are several steps involved in this task, you may want to model this activity while "thinking aloud." Include a discussion about assigning a place value to the number rolled on a given die. Ask questions such as, "Will you make the 3 on this die represent 3, 30, or 300? How will each of those numbers look if we use base ten blocks?" Some students may need extra support with this concept. It is also important to model the use of dots, sticks, and squares to represent base-ten concepts.

When using dice, base ten blocks, or any other manipulatives, students need to understand procedures and routines associated with using them. Consider reviewing your classroom norms and giving the students a few minutes to explore with the pieces and make observations before moving into the task.

ESSENTIAL QUESTIONS

- How do the value of digits change when their position in a number changes?
- How can we tell which numbers are larger or smaller than others?

MATERIALS

- Three 6-sided dice per pair
- Base ten blocks
- "Building Base Ten Numbers" recording sheet
- Place Value Charts (optional)

GROUPING

Partners or Individually

NUMBER TALK

Strategy: Making 10
This strategy encourages students to "make 10" as they add mentally. "The sequence of problems within a given number talk allows students to apply strategies from previous problems to subsequent problems."

7 + 7 + 3 + 3 5 + 8 + 2 + 5 5 + 8 + 4 + 2 + 5 7 + 5 + 8 + 2 + 3

Please refer to pgs. 125-128 in *Number Talks* by Sherry Parrish for more examples of number talks that will further develop this strategy.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students will roll dice and make two three-digit numbers from the results. Students will then draw or use base ten blocks to build models of the numbers created and explain how they know which numbers are larger or smaller.

Task Directions
Gather students in the meeting area. Model with students the "Building Base Ten Numbers" recording sheet. Then allow students to work with a partner to complete the task.

Your task is to build numbers and identify them. Use dice and base ten blocks or models to complete this exercise.

1. Roll all 3 dice at once.
2. Create the smallest number possible using all three dice.
3. Create the largest number possible using all three dice.
4. Using the smallest number of base ten pieces possible, draw (or build) a model of each number you recorded. Have the flats represent hundreds, the rods represent tens, and the unit cubes represent ones. Use words to write how each of the two numbers is spoken. Write the numbers in expanded notation.
5. Repeat the same exercise two more times and record.
6. When you have completed all your rolls, put a star beside the greatest number you rolled. Then put a check beside the smallest number you rolled. Explain how you know what the largest and smallest numbers are possible when using three dice.

FORMATIVE ASSESSMENT QUESTIONS

- How did you decide in which order to place your dice?
- What would happen if you changed the order of your dice?
- What would happen to the size of your numbers if you used more or fewer dice?
- Which representation of your numbers makes the most sense to you?

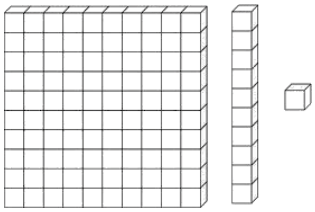
DIFFERENTIATION

Extension

- Students may use four dice instead of three (or use three dice and always have one digit be zero). If you continue to have them draw/build base ten models, you will need to provide the large cube in the base ten blocks to represent the thousands place. If students have access to base ten stamps, those may be used instead of, or in addition to, the actual manipulatives.

Intervention

- Students may need to use a place value chart to align their digits.
- Have students complete the task in small groups with direct instruction or modeling for additional support.
- For students who have difficulty counting the dots on a die, dice with numbers printed on them may be used.



Name: _____

Building Base-Ten Numbers

Your task is to build numbers and identify them. Use dice and base ten blocks or models to complete this exercise.

1. Roll all 3 dice at once.
2. Create the smallest number possible, using all three dice.
3. Create the largest number possible, using all three dice.
4. Using the smallest number of base ten pieces possible, draw (or build) a model of each number you recorded. Have the flats represent hundreds, the rods represent tens, and the unit cubes represent ones. Use words to write how each of the two numbers is spoken. Write the numbers in expanded notation.
5. Repeat the same exercise two more times and record.
6. When you have completed all your rolls, put a star beside the greatest number you rolled. Then put a check beside the smallest number you rolled. Explain how you know what the largest and smallest numbers are possible when using three dice.

Roll #1

Smallest Number	Model with Drawings	Expanded Notation (ex. 200 + 30 + 6)
Largest Number	**Model with Drawings**	**Expanded Notation**

Roll #2

Smallest Number	Model with Drawings	Expanded Notation
Largest Number	**Model with Drawings**	**Expanded Notation**

Roll #3

Smallest Number	Model with Drawings	Expanded Notation
Largest Number	**Model with Drawings**	**Expanded Notation**

CONSTRUCTION TASK: What's My Number?

Approximately 3 Days (Adapted from Content Standards: Kindergarten through Grade Eight, Illustrative Mathematics)

In this task, students try to guess a mystery number from place value clues. They then create clues to help others guess their number.

STANDARDS FOR MATHEMATICAL CONTENT:

MCC2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

a. 100 can be thought of as a bundle of ten tens — called a "hundred."
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MCC2.NBT.2 Count within 1000; skip-count by 5s, 10s, and 100s.

MCC2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

STANDARDS FOR MATHEMATICAL PRACTICE:

Although all standards for mathematical practice should be applied regularly, this task lends itself to the standards below:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students should have familiarity with base-ten models. This activity will encourage students to represent numbers in a variety of ways. "What is another way you can show 42 besides 4 bundles and 2 units? Let's see how many ways you can find." Students will begin to understand equivalent representations through groupable models and words. These models should reinforce the students base ten understanding. Many groupable models are shown on page 127 of Van de Walle's *Teaching Student-Centered Mathematics: Grades K-3*.

A systematic approach to listing the solutions is not required to meet the standard, but it is a thorough way for students to organize and explain how they found all the possible ways to make 124 using base-ten blocks.

(Suggestion: See Teaching Student-Centered Mathematics by Van de Walle for additional base-ten riddle examples and learning games. Pages 132-134.)

- *Activity 5.4 – "Odd Groupings"*
- *Activity 5.5 – "Three Other Ways"*
- *Activity 5.6 – "Base Ten Riddles"*

This task acts as a bridge between understanding place value and using strategies based on place value for addition and subtraction. Within the classroom context, this activity can be differentiated using numbers that are either simpler or more difficult to manipulate across tens and hundreds.

ESSENTIAL QUESTIONS

- Why should we understand place value?
- What are the different ways we can show or make (represent) a number?
- What is the difference between place and value?

MATERIALS

- 0-99 chart (optional)
- Math Journals to record/explain concepts (optional)
- Base 10 manipulatives, as needed
- Optional printable cards located in intervention section.

GROUPING

Small Group

NUMBER TALK

Strategy: Making 10
This strategy encourages students to "make 10" as they add mentally. "The sequence of problems within a given number talk allows students to apply strategies from previous problems to subsequent problems."

9 + 5 + 2 + 5 + 1 4 + 8 + 3 + 7 + 6 2 + 6 + 8 + 5 + 4 7 + 2 + 8 + 4 + 3

Please refer to pgs. 125-128 in *Number Talks* by Sherry Parrish for more examples of number talks that will further develop this strategy.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I
Pick a student to choose any two-digit number. Call on students to ask yes or no questions about the "secret number." Model asking questions using place value terms or comparison terms. As students are given clues to the "secret number," they could eliminate numbers on their 0-99 chart.

This activity helps students build flexibility using language and equivalent representations of numbers. Base ten manipulatives should be available if students desire to use them to visualize the numbers. Students could also draw pictures to help them make up their questions to find the mystery number. Children may begin with very simple, straightforward questions about the number, but eventually they will start to try to make up more difficult clues by combining the amount of ones, tens, or hundreds.

Part II
Create their own game set with clues. Each child could create 5 or more cards and then place these cards in a center or for a math mini lesson.

Examples of clues:

- I have a 4 in my tens place and a 2 in my ones place. Who am I?
- I have 1 more ten than the number 14 and 3 ones. Who am I?
- I am 35. I have 25 ones. How many tens do I have?
- I am 1 ten, 5 hundreds, and 29 ones. Who am I?

Commentary: A systematic approach to listing the solutions is not required to meet the standard, but it is a thorough way for students to explain how they found all the possible ways to make 124 using base-ten blocks.

The list of all ways using 1 hundred is:
1 hundred, 2 tens, 4 ones.
1 hundred, 1 ten, 14 ones
1 hundred, 0 tens, 24 ones.

The list of all ways not using any hundreds is:

12 tens, 4 ones.
11 tens, 14 ones
10 tens, 24 ones
9 tens, 34 ones
8 tens, 44 ones
7 tens, 54 ones
6 tens, 64 ones
5 tens, 74 ones
4 tens, 84 ones
3 tens, 94 ones
2 tens, 104 ones
1 ten, 114 ones
0 tens, 124 ones.

To know the list is complete as we make it, we can start with the standard way, namely 1 hundred, 2 tens, and 4 ones, and exchange tens for ones, one at a time, to get the first list. Then we exchange the hundred for 10 tens, to get a total of 12 tens along with 4 ones. Once again, we can exchange tens for 10 ones step by step in order to get the second list.

Part III
Implement game cards and clues that involve skip counting. Begin with two digit numbers so that the students can use a 0-99 chart to assist. Encourage students to write down a number and ask their partners to locate a number that is 5 more, 10 less, 100 more, etc. than the stated number. Discuss with the students strategies that they find helpful in skip counting, especially when they are skip counting by multiples of 10 or 100.

Examples:

1. What number is 1 more than 99?
2. What number is 1 less than 600?
3. What is 5 less than 50?
4. What is 5 more than 100?
5. What number is 10 more than 90?
6. What number is 10 less than 300?
7. What number is 100 more than 570?
8. What number is 100 less than 149?

FORMATIVE ASSESSSMENT QUESTION

- How can you organize your solutions?

DIFFERENTIATION

Extension

- "Three Other Ways", Activity 5.5 in Teaching Student-Centered Mathematics, Grades K-3. Working in groups or pairs. First they show "four hundred sixty-three" on their desks with strips and squares in the standard representation. Next they find and record at least three other ways of showing this number.

Intervention

- Students who are still having difficulty with understanding the magnitude of numbers and their place value can be given Popsicle sticks to bundle into groups of ten. As they are bundled, the student places the Popsicle sticks in cups or on a mat, labeled ones, tens, and hundreds. This is more hands-on for the student who has a difficult time accepting the base 10 stick as a group of ten because it is already together. Have the student stop on occasion and count out what they have on their mat. Add single Popsicle sticks to the mat and ask what number that would make. Have students count the Popsicle sticks in bundles then take a bundle apart and have the student

count it again. This extra practice will help them recognize that the number doesn't change even though the bundle of ten has been taken apart. Finally, the student could trade each bundle of ten or one hundred for the matching base 10 blocks or snap cubes.

- Using pennies, dimes and dollars may also help students to grasp the idea of regrouping ("changing") ones, tens and hundreds, but still keeping the same total amount.

- Online pre-made card sets:

"Who Has? "- More or less - http://www.mathwire.com/whohas/whmoreorless.pdf
"Who Has? with tens and ones - http://www.mathwire.com/whohas/whbaseten.pdf
"Who Has?" with hundreds - http://www.mathwire.com/whohas/whohaspv.pdf

PRACTICE TASK: Capture the Caterpillar

Approximately 2 Days

In this task, students try to get as close as possible to a target number using their knowledge of place value.

STANDARDS FOR MATHEMATICAL CONTENT:

MCC2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

a. 100 can be thought of as a bundle of ten tens — called a "hundred."
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MCC2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

MCC2.NBT.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE:

Although all standards for mathematical practice should be applied regularly, this task lends itself to the standards below:

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
6. Attend to precision.

BACKGROUND KNOWLEDGE:

Students should have a good understanding of place value with groupable base ten models as well as pre-grouped base ten model concepts before proceeding with this activity. According to Van de Walle, "It is easy to attach words to both materials and groups without realizing what the materials or symbols represent." A student who places three counters in the tens section should understand that this represents 3 groups of ten or 30, not just 3. (Chapter 5 – *Teaching Student Centered Mathematics, Grades K - 3* by Van de Walle)

ESSENTIAL QUESTIONS

- Why should we understand place value?
- What are the different ways we can show or make (represent) a number?
- What is the difference between place and value?
- If we have two or more numbers, how do we know which is greater?

MATERIALS

- Small counters such as beans
- Digit cards #'s 0 – 9 (1 set per group)
- Pair of dice for each group
- "Capture the Caterpillar" game mat (1 per student)
- "Capture the Caterpillar" recording sheet (1 per student)
- Optional: Dry erase board and markers to display target number for each team

GROUPING

Small groups (2-3 students)

NUMBER TALK

Strategy: Making 10
This strategy encourages students to "make 10" as they add mentally. "The sequence of problems within a given number talk allows students to apply strategies from previous problems to subsequent problems."

9 + 1 9 + 1 + 5 9 + 6 9 + 4

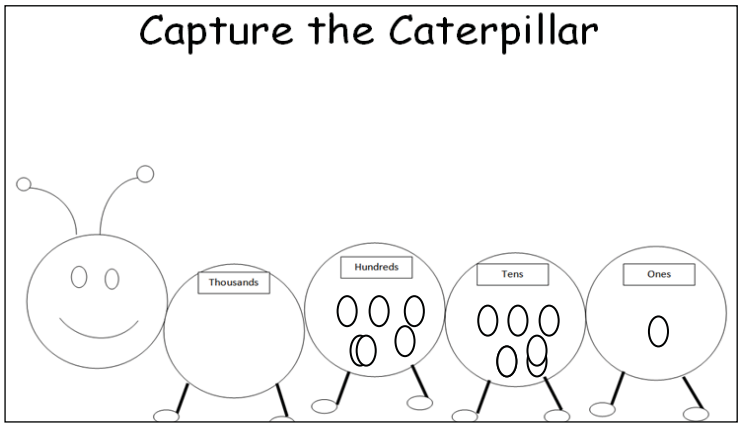
Please refer to pgs. 125-128 in *Number Talks* by Sherry Parrish for more examples of number talks that will further develop this strategy.

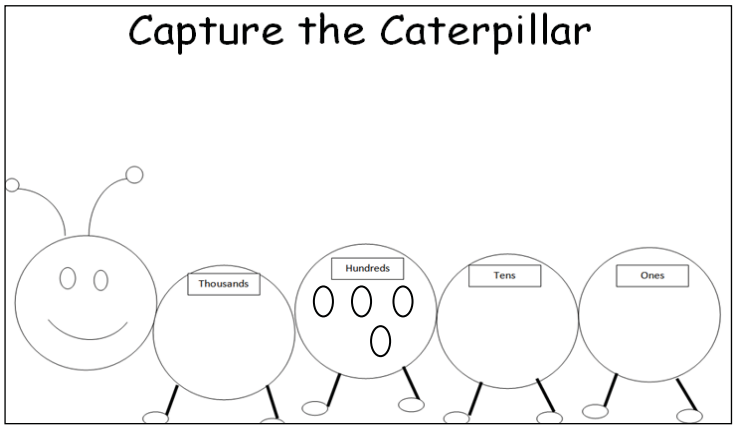
TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part 1
Divide class into small groups of 2 -3 students. Students will take turns being the group leader. The group leader will pick 3 digit cards and arrange them to make a number. This number should be written on each child's recording sheet. Students will then roll a set of dice to determine how many counters the group will receive. These counters will be arranged on the "Capture the Caterpillar" place value game mat to create a number as close to the target number as possible. Ex. **Target number = 453**

If the student rolls a 4 and a 6, they will get 10 counters. These counters may be divided into any of the place value sections on the "Capture the Caterpillar" game mat. In the picture below, the students arranged the 10 counters to create 451.

Once the students create their number, they will write it on the recording sheet and circle the appropriate symbol. The students will then write the number they created in expanded notation. The student in the group that gets closest to the Target number wins.
In the example below, the group rolled a 1 and a 3. After collecting 4 counters, the students placed all of the counters in the hundreds section to create the number 400.





FORMATIVE ASSESSMENT QUESTIONS

- How close is your number to the target number?
- Is your number smaller or larger than the target number?
- How would you write your number in word form?
- Can you represent this number in expanded form?
- What is the difference between place and value?

DIFFERENTIATION

Extension

- Vary the task by having students roll 3 dice to collect additional counters.
- Have students each roll a set of dice and create their own number. The numbers can be compared. Who is closest to the target number?
- Make true equations. Write one number in every space. Draw a picture if it helps.

1. 1 hundred + 4 tens = _____
   4 tens + 1 hundred = _____
2. 14 tens = 10 tens + _____ tens
   14 tens = _____ hundred + 4 tens
   14 tens = _____
3. 7 ones + 5 hundreds = _____
4. 8 hundreds = _____
5. 106 = 1 hundred + _____tens + _____ones
   106 = _____tens + _____ones
   106 = _____ones
6. 90 + 300 + 4 = _____

Students determine the number of hundreds, tens and ones that are necessary to write equations when some digits are provided. Student must, in some cases, decompose hundreds to tens and tens to ones. The order of the sum does not always correspond to the place value, making these

problems less routine than they might seem at first glance. See the solution for detailed information about the parts of this task.

Solution: Annotated solutions

1. 140, 140.
   The first problem asks for the same number (140) in different ways. This emphasizes that order doesn't matter in addition – yet order is everything when using place-value notation.
2. 14 tens = 10 tens+4 tens
   14 tens = 1 hundred+4 tens
   14 tens = 140.
   In this problem, the base-ten units in 140 are bundled in different ways. In the first line, "tens" are thought of as units: 14 things = 10 things + 4 things.
3. 507.
   By scrambling the usual order, the third problem requires students to link the values of the parts with the order of the digits in the positional system. Also, to encode the quantity, the student will have to think: "no tens," emphasizing the role of 0.
   7 ones + 5 hundreds = 507
4. 800.
   In the fourth problem, the zeros come with a silent "no tens and no ones":
   8 hundreds = 800
5. 106 = 1 hundred + 0 tens + 6 ones
   106 = 10 tens + 6 ones
   106 = 106 ones
   In this problem, the base-ten units in 106 are bundled in different ways. This is helpful when learning how to subtract in a problem like 106 – 34 by thinking about 106 as 100 tens and 6 ones.
6. 394.
   The sixth problem is meant to illustrate the notion that if the order is always given "correctly," then all we do is teach students rote strategies without thinking about the size of the units or how to encode them in positional notation.
   90 + 300 + 4 = 394

Intervention

- Reduce target number to a two digit number.

Capture the Caterpillar Recording Sheet

Round #	**Target Number**	Compare the Numbers (Circle One)	**Our Number**	Our Number in Expanded Notation (Ex. 400 + 20 + 6)
1.		< = >		
2.		< = >		
3.		< = >		
4.		< = >		
5.		< = >		

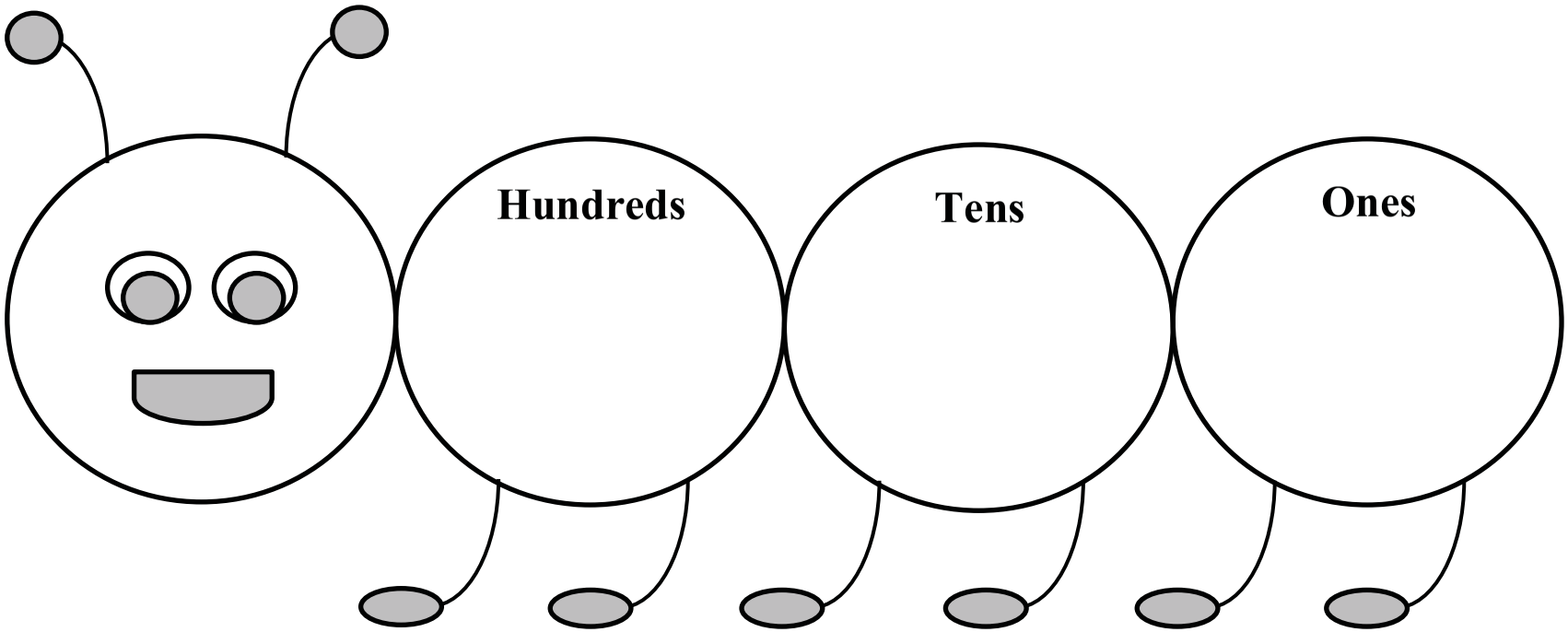
Which number from above was closest to the target number? _____

How do you know? _____

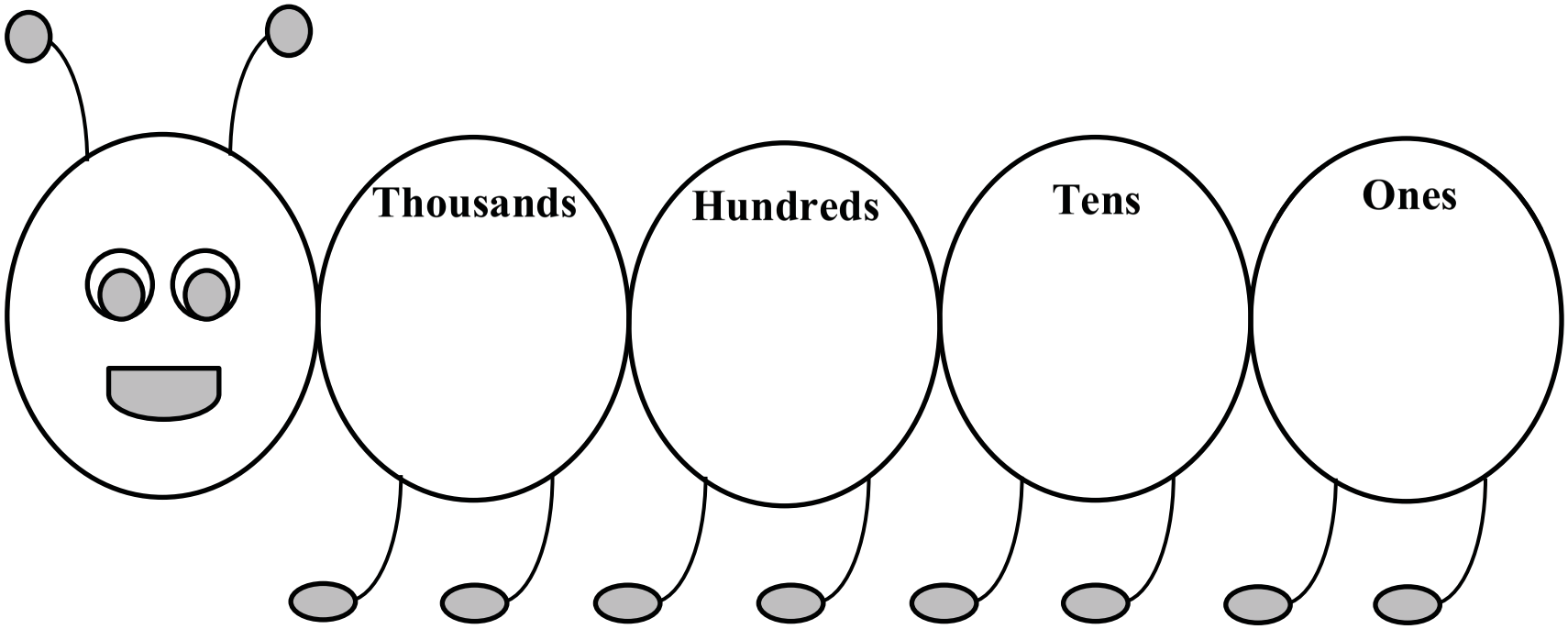
_____

_____

CAPTURE THE CATERPILLAR – 100s Edition



CAPTURE THE CATERPILLAR – 1,000s Edition



Name _____ Date _____

Roll dice to come up with a 3-digit number. Find different ways you can show your number in the base-ten system.

My Number	Hundreds	Tens	Ones
425			425
	4	2	5
		42	5
		40	25

At this point in the unit you should administer a Formative Assessment Lesson. This should be given approximately 2/3 of the way through the unit to guide and inform your instruction.

Formative Assessments Lessons (FALs)
What is a Formative Assessment Lesson (FAL)? The Formative Assessment Lesson is designed to be part of an instructional unit typically implemented approximately two-thirds of the way through the instructional unit. The results should then be used to **inform** the instruction that will take place for the remainder of the unit.
Formative Assessment Lessons are intended to support teachers in formative assessment. They both reveal and develop students' understanding of key mathematical ideas and applications. These lessons enable teachers and students to monitor in more detail their progress towards the targets of the standards. They assess students' understanding of important concepts and problem solving performance, and help teachers and their students to work effectively together to move each student's mathematical reasoning forward.

What does a Formative Assessment Lesson look like in action? Videos of Georgia Teachers implementing FALs can be accessed HERE and a sample of a FAL lesson may be seen HERE.

PRACTICE TASK: Fill the Bucket

Approximately 3 Days

In this task, students use digit cards to build the largest and the smallest numbers possible. They then use >, =, and < to compare the numbers.

STANDARDS FOR MATHEMATICAL CONTENT:

MCC2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

a. 100 can be thought of as a bundle of ten tens — called a "hundred."
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MCC2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

MCC2.NBT.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE:

Although all standards for mathematical practice should be applied regularly, this task lends itself to the standards below:

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
3. **Construct viable arguments and critique the reasoning of others.**
6. **Attend to precision.**

BACKGROUND KNOWLEDGE

(Information adapted from the North Carolina DPI Instructional Support Tools)

Some students may not move beyond thinking of the number 358 as 300 ones plus 50 ones plus 8 ones to the concept of 8 singles, 5 bundles of 10 singles or tens, and 3 bundles of 10 tens or hundreds. Use base-ten blocks to model the collecting of 10 ones (units) to make a ten (a rod) or 10 tens to make a hundred (a flat). It is important that students connect a group of 10 ones with the word ten and a group of 10 tens with the word hundred.

Refer back to the Background Knowledge portion of the Capture the Caterpillar task for further elaboration.

ESSENTIAL QUESTIONS

- Why should we understand place value?
- What are the different ways we can show or make (represent) a number?
- What is the difference between place and value?
- If we have two or more numbers, how do we know which is greater?

MATERIALS

- 2 sets of number cards (0-9)
- "Fill the Bucket" recording sheet
- Jordan's number sheets
- Race to the Finish Line Assessment

GROUPING

Whole Group/Partners

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part 1 – Digit Switch – whole group
Draw a large place value chart on board (or floor) so that students can stand in front of it. Label the chart with ones, tens, hundreds, and one thousands. Write the digits 0 – 9 on separate sheets of paper. Pass out a number to three or four student volunteers. Have each student stand in front of the place value chart to form a number. Write the number on the board. Encourage the students to switch places and see how many additional numbers they can form. Discuss how the numbers are different even though they contain the same digits. Which number was the largest? Which number was the smallest? How do you know?

Part II – Small Group / Pairs (see attached Jordan's Numbers):
(Adapted from: http://illustrativemathematics.org/standards/k8)

Jordan had cards with the numbers 0 to 9 written on them. She flipped over three of them. Her teacher said:
If those three numbers are the digits in another number, what is the largest three-digit number you can make?

1. First Jordan put the 8 in the hundreds place. Is this the right choice for the hundreds place? Explain why or why not.

2. Next, Jordan said, "It doesn't matter what number I choose for the other places, because I put the biggest number in the hundreds place, and hundreds are bigger than tens and ones." Is he correct? Explain.

It is important that students be asked to explain well beyond saying something like "He should choose the 8 because it is the biggest." They should be asked to think through the other possibilities and then draw on their ability to compare three digit numbers (as developed in 2.NBT.4) to complete the task.

In the second part, students are presented with an incorrect statement supported by a correct one. It is worth pausing to ask students to carefully sort this through, since attending to reasoning that is partially true and partially false lends itself to the SMP.3: Constructing viable arguments and critiquing the reasoning of others.

One can ask students if they know how to build the biggest three-digit number given any three numbers between 0 and 9 to use as digits. If students can't explain the best strategy at the greatest level of generality, one could have them play the game and explain how their method works in examples.

Solutions:

1. Jordan is correct in putting the 8 in the hundreds place. If the 8 is in the hundreds place, the number will be bigger than 800. If she puts the 5 in the hundreds place, the number must be smaller than 600. If she puts the 1 in the hundreds place, the number must be smaller than 200.

2. Jordan is not correct; all the digits matter. Tens are greater than ones, so she needs to choose the next largest number for the tens place. If she chooses 1 for the tens place and then 5 for the ones place the result is 815. The only other possibility is if she chooses 5 for the tens place and then 1 for the ones place, yielding 851, which is greater than 815. So the choice matters (and 851 is the "winning" total).

Part III – (3 digit numbers)
Students use two sets of number cards (0-9). Each student will draw 3 cards from their pile and arrange the cards to form a number. They will write the digits by the buckets on their recording sheet. The goal is to build the biggest number. After the students have filled in their first set of buckets, they will compare to see who has the largest number. The student who had the largest number will circle their bucket. The students cannot move to the next bucket until all of the spaces are filled in.

As the students are working, circulate around the room. Pay attention to the strategies they are using. Notice which students appear to put numbers down randomly with no regard to place value. Make sure to discuss the methods they are using to determine if it is a strategy or a misconception.

Part IV - (4 digit numbers)- Optional
Repeat as above but have students draw 4 cards and use recording sheet for 4-digit numbers.

Part V
Students take the largest and smallest number and represent it in four different ways.
Ask questions such as:
Do you have a strategy for choosing where to write the numbers down?
How did you determine who had the largest number when the first number was the same?

Comment: Students should be able to record both their number and their partner's number on the recording sheet. If not, a recording sheet can be shared between pairs.

Part VI
Build on what the students have learned about place value and number comparisons to complete Race to the Finish.

Three cars are in a race. The numbers on the cars are 8, 5, and 2. Using these numbers, create six possible combinations that could be created as the cars cross the finish line.
List these numbers in order from least to greatest.

_____ _____ _____ _____ _____ _____
Even though the numbers use the same digits, they do not have the same value. How does moving a digit change the value of the number?

FORMATIVE ASSESSMENT QUESTIONS

- What is the difference between place and value?
- How does the order of the digits change the value?
- How did you know that you created the largest number?
- How did you know that you created the smallest number?
- What symbol would you use to compare these numbers?
- How would you say this number in word form?

DIFFERENTIATION

Extension
- Vary the task by having students build the smallest number.
- Expand the group to four players if students are comfortable with making numbers. Comparing between multiple players will reinforce the importance of place value.
- Ask students to write in Math Journal about their experience.

Intervention

- Allow the students work on their own to fill their bucket. Students may move or change a number one time per play. If they choose to change a number, have them explain why they want to make that change.

Name _____ Date_____

Jordan's Numbers

Jordan had cards with the numbers 0 to 9 written on them. He flipped over three of them.

1	8	5

His teacher said:
Use the cards to make the largest three-digit number you can make?

1. First Jordan put the 8 in the hundreds place. Is this the right choice for the hundreds place? Explain why or why not.

_____

_____

_____

2. Next, Jordan said, "It doesn't matter what number I choose for the other places, because I put the biggest number in the hundreds place, and hundreds are bigger than tens and ones." Is he correct? Explain.

_____

_____

_____

Name _____ Date_____

Fill the Bucket (3-Digit Numbers)

Player One	<, >, or =	Player Two
1. _____ _____ _____	<, >, or = ◯	1. _____ _____ _____
2. _____ _____ _____	<, >, or = ◯	2. _____ _____ _____
3. _____ _____ _____	<, >, or = ◯	3. _____ _____ _____
4. _____ _____ _____	<, >, or = ◯	4. _____ _____ _____

My Largest Number: _____

My Smallest Number: _____

Explain how you knew which number was the largest and which was the smallest.

_____

_____

_____

Name _____ Date_____

Fill the Bucket (4-Digit Numbers)

Player One		Player Two
1. _____ _____ _____ _____	<, >, or = ◯	1. _____ _____ _____ _____
2. _____ _____ _____ _____	<, >, or = ◯	2. _____ _____ _____ _____
3. _____ _____ _____ _____	<, >, or = ◯	3. _____ _____ _____ _____
4. _____ _____ _____ _____	<, >, or = ◯	4. _____ _____ _____ _____

My Largest Number: _____

My Smallest Number: _____

Explain how you knew which number was the largest and which was the smallest.

_____

_____

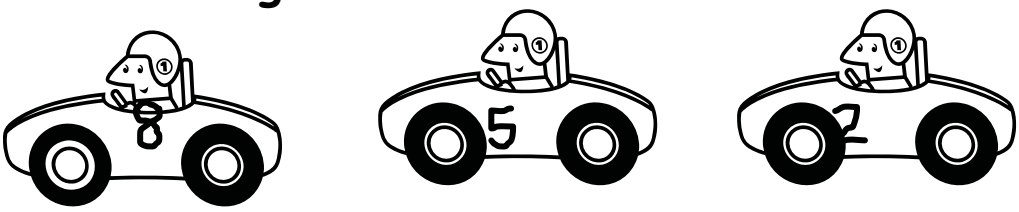
_____

Fill the Bucket- Digit Cards

0	1
2	3
4	5
6	7
8	9

Name: _____

Constructing Task - Race to the Finish Line



Three cars are in a race. The numbers on the cars are 8, 5, and 2. Using these numbers, create six possible combinations that could be created as the cars cross the finish line.

List these 3-digit numbers in order from least to greatest.

_____ , _____ , _____ , _____ , _____ , _____

Even though the numbers use the same digits, they do not have the same value. How does moving a digit change the value of the number?

PRACTICE TASK: High Roller

Approximately 2 Days

In this task, students use reasoning to attempt to create the largest possible number.

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

a. 100 can be thought of as a bundle of ten tens — called a "hundred."
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MCCNBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

MCC2.NBT.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE

Although all standards for mathematical practice should be applied regularly, this task lends itself to the standards below:

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Within these standards, students will extend their understanding of the base-ten system. This includes ideas of counting in tens, and multiples of tens, as well as number relationships involving these units, including comparing numbers and their relative sizes. Students understand multi-digit numbers (up to 1,000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones). Assessments will only include numbers within 1,000. Students will also begin to understand that a digit's place determines its value.

ESSENTIAL QUESTIONS

- Why should we understand place value?
- What are the different ways we can show or make (represent) a number?

- What is the difference between place and value?
- If we have two or more numbers, how do we know which is greater?

MATERIALS

- One die for each child (8- sided dice and/or 0-9 dice (10-sided) may be used)
- " High Roller" recording sheet

GROUPING

Small Group

NUMBER TALK

Strategy: Making 10
This strategy encourages students to "make 10" as they add mentally. "The sequence of problems within a given number talk allows students to apply strategies from previous problems to subsequent problems."

7 + 3 7 + 3 + 3 7 + 6 7 + 8

Please refer to pgs. 125-128 in *Number Talks* by Sherry Parrish for more examples of number talks that will further develop this strategy.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Students work in groups of two - four to play the game. Create a game board or chart with boxes in a row labeled with the place value (see below). Students should place the numbers from their rolls in the four boxes. A student in the group rolls the die four times. After each roll, each student fills in the number rolled in a box on their individual game card to try to make the largest number possible. Once the number is written they may not erase or make a change in the order of their numbers. After all four rolls have been completed, the students compare with their group members to determine who came up with the largest number. The game should be played multiple times for students to begin to develop strategies for number placement. Students should discuss their strategies for playing the game.

Different types of dice could be used. For example, instead of the traditional 1-6 die, students could use 0-9 dice, 0-5 or 5-9 dice or all even numbers or all odd numbers (of course one number would have to be on the die twice for this to work, but then that opens up discussions about probability, which is not addressed in CCGPS until middle school). After the game is played several times, students should discuss what they figured out about playing the game. Students should discuss their strategies for playing the game. Also, students should discuss what problems they encountered when playing the game. Typical

problems include rolling lots of small numbers and deciding where to place them, rolling the "middle" numbers (a 3 or 4 on a traditional die) and trying to decide where to place it.
Ask questions such as:

- What do you do when you roll the smallest number on the die? Why? What if that place value spot is already taken?
- How do you decide where to place the "middle" numbers on the die?
- Which numbers are easy to place? Why?

Observe students to see if they have a strategy. Have them explain as they are playing so any misconceptions can be addressed. Allow the students to play a couple of practice rounds if needed.

***Variation**:* As students become familiar with larger numbers and their relative value, have students write out the number in expanded notation. For example, if a student rolls a "3" and they choose the hundreds column, they should write out three hundred in the space on the recording sheet.

FORMATIVE ASSESSMENT QUESTIONS

- What do you do when you roll the smallest number on the die? Why? What if that place value spot is already taken?
- How do you decide where to place the "middle" numbers on the die?
- Which numbers are easy to place? Why?

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DIFFERENTIATION

Extension

- Have students write about the strategy they use to play the game. Encourage them to write all they can about their strategy.
- Students could also try to make the smallest number by playing the game "Low Roller."
- Players could keep score of who had the biggest or smallest number during the game.
- Students use tally marks to record the number of times they had the biggest number.
- Make a graph showing how many times each player has the highest number. At the end of play the groups would share their findings with the class.
- Students could be required to write the word name for each number they built using both words and expanded notation.

Intervention

- Use dice that have numbers or cover dots with stickers with numbers written on them. Allow students to practice rolling the dice and making different combinations with two dice first. Have them write these down so they can visualize the difference. Add a third die and repeat, writing down the combination before rolling again.

Name: _____

High Roller
100's Edition

Round	Hundreds	Tens	Ones
1.			
2.			
3.			
4.			

Compare two numbers from above with the symbols <, >, or =.

_____ ◯ _____

Make a 3 digit number that is larger than your largest number.

_____

Make a 3 digit number that is smaller than your smallest number.

_____

On the back of this paper, explain your reasoning. How do you know the numbers you created are smaller or larger?

Name: _____

High Roller
1,000's Edition

Round	Thousands	Hundreds	Tens	Ones
1.				
2.				
3.				
4.				

Compare two numbers from above with the symbols <, >, or =.

_____ ◯ _____

Make a 4 digit number that is larger than your largest number.

_____

Make a 4 digit number that is smaller than your smallest number.

_____

On the back of this paper, explain your reasoning. How do you know the numbers you created are smaller or larger?

PRACTICE TASK: Place Value Breakdown

Approximately 1 Day

In this task, students generate numbers to put into expanded form.

STANDARDS FOR MATHEMATICAL CONTENT

MCC2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

a. 100 can be thought of as a bundle of ten tens — called a "hundred."
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MCC2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

MCC2.NBT.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE

Although all standards for mathematical practice should be applied regularly, this task lends itself to the standards below:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
6. Attend to precision.

BACKGROUND KNOWLEDGE

This task follows the "High Roller" Game and includes expanded notation. Students will only be assessed on numbers within 1,000, refer back to page 82 for the background knowledge.

ESSENTIAL QUESTIONS

- How can place value help us tell which of two or more numbers is greater?
- Why should you understand place value?
- What are different ways we can show or make (represent) a number?
- What is the difference between place and value?

MATERIALS

- One die per pair of students
- (8- sided dice and/or 0-9 dice (10-sided) may be used)

- Recording sheet

GROUPING

Partners

NUMBER TALK

Strategy: Making 10
This strategy encourages students to "make 10" as they add mentally. "The sequence of problems within a given number talk allows students to apply strategies from previous problems to subsequent problems."

6 + 4 6 + 4 + 1 6 + 5 6 + 8

Please refer to pgs. 125-128 in *Number Talks* by Sherry Parrish for more examples of number talks that will further develop this strategy.

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSON

Students will order digits in an attempt to create the highest or lowest possible number. Students will use previous experiences with place value to predict the place a number should be written on the recording sheet in order to create the highest or lowest number.

Students should be given a recording sheet that is divided into columns and rows. The number of columns will determine how large the number should be. In this lesson, there should be four columns to represent thousands, hundreds, tens, and ones. The number of rows will determine how many rounds the students should play.

The goal is to create the highest or lowest number for each row. The student partners will decide before playing whether they are looking for the highest or lowest number per round. The first student rolls the die, decides where the digit should be written on their recording sheet and describes it to their partner. "I rolled a 4, I'm going to put it in the tens place to make 40." The second student does the same. The game continues in this way until both students have made a complete number. The person with the highest (or lowest) number will draw a star next to their number.

Example:

Thousands	Hundreds	Tens	Ones	Expanded Notation	Total
2	4	6	2	2000 + 400 + 60 + 2	2,462

FORMATIVE ASSESSMENT QUESTIONS

- What strategies did you use to create your number?
- Why did you put the number _____ in that location?

- How can you say the number you created in words?
- What is the value of _____ in the number _____?

DIFFERENTIATION

Extension

- Encourage students to skip count by 5's, 10's, and 100's from the number that is created.

Intervention

- Decrease numbers to three digit numbers. Students will not be formally assessed on 4-digit numbers greater than 1,000.
- Allow students to use stackable place value cards or arrow cards to create expanded form. (http://www.senteacher.org/Worksheet/47/PlaceValue.xhtml)

Name: _____ Date: _____

Place Value Breakdown – 100s Edition

Hundreds 100	Tens 10	Ones 1	Expanded Notation _ _ _ + _ _ + _	Total

1. What is the value of 5 in 954? _____ How do you know?

   _____

   _____

2. What is the value of 6 in 672?_____ How do you know ?

   _____

   _____

3. If the number 854 was increased by 10, what would the new number be?

   _____

4. If the number 1,000 was decreased by 1, what would the new number be?

   _____

Name: _____ Date: _____

Place Value Breakdown – Thousands Edition

Thousands 1,000	Hundreds 100	Tens 10	Ones 1	Expanded Notation _ _ _ _ + _ _ _ + _ _ + _	Total

1. What is the value of 5 in 5,514? _____ How do you know?

   _____

   _____

2. What is the value of 6 in 3,672?_____ How do you know ?

   _____

   _____

3. If the number 4,954 was increased by 10, what would the new number be?

   _____

4. If the number 1,000 was decreased by 1, what would the new number be?

   _____

CULMINATING TASK: Carol's Numbers

Approximately 2 Days (Adopted from NYC Department of Education)

This is the culminating task which incorporates all four standards in this unit.

STANDARDS FOR MATHEMATICAL CONTENT:

MCC2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:

a. 100 can be thought of as a bundle of ten tens — called a "hundred."
b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

MCC2.NBT.2 Count within 1000; skip-count by 5s, 10s, and 100s.

MCC2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

MCC2.NBT.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

STANDARDS FOR MATHEMATICAL PRACTICE

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
3. **Construct viable arguments and critique the reasoning of others.**
4. **Model with mathematics.**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
7. **Look for and make use of structure.**
8. **Look for and express regularity in repeated reasoning.**

BACKGROUND KNOWLEDGE

By this point in the unit, students have had experience:

- understanding the value placed on the digits within a three-digit number
- recognizing that a hundred is created from ten groups of ten
- using skip counting strategies to skip count by 5s, 10s, and 100s within 1,000
- representing numbers to 1,000 by using numbers, number names, and expanded form
- comparing multi-digit numbers using >, =, <

ESSENTIAL QUESTIONS

- How can place value help us tell which of two or more numbers is greater?
- Why should you understand place value?
- What are different ways we can show or make (represent) a number?
- What is the difference between place and value?

MATERIALS

- Carol's Number's

GROUPING

Individual

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSON

This culminating task represents the level of depth, rigor, and complexity expected of all second grade students to demonstrate evidence of learning of standards stated above. Students will show their understanding of manipulating digits in each place value position. Skip counting is then addressed, if your students have not had adequate practice skip counting by any number refer back to the Number Hop task. Finally, students will be comparing numbers and writing numbers in expanded form, refer back to the Base Ten Pictures task and What's my Number for students that need more clarification on these skills.
(Task adopted from New York Department of Education, Common Core Aligned Task with Instructional Supports, http://schools.nyc.gov/NR/rdonlyres/CAC1375E-6DF9-475D-97EE-E94BAB0BEFAB/0/NYCDOEG2MathCarolsNumbers_Final_020112.pdf)

Assessment should be administered on two separate days.

For examples of scored student work, please visit: http://www.scboces.org/17621092392658243/lib/17621092392658243/2nd_Grade_-_Carols_Numbers.pdf

Name _____ **Date:** _____

CAROL'S NUMBERS - Part I – NBT1

Carol has three number cards.

4	7	2

1. What is the largest three-digit number Carol can make with her cards?

2. What is the smallest three-digit number Carol can make with her cards?

3. Explain to Carol how she can make the smallest possible number using her three cards.

_____

_____

_____

_____

4. Carol's teacher asked her what the value of the 7 is in 472. She answered that it was in the tens place.

Did she answer his teacher's question? If yes, explain why. If no, what is the correct answer?

_____

_____

_____

Carol's Numbers - Part II – NBT 1, NBT 2

Carol likes to jump rope. When she jumps, she likes to skip count by 5's, 10's and 100's.

5. This time Carol skip-counts by 5's. She stopped at 45. Draw her jumps.

6. How many jumps will it take to reach 45? _____

7. How do you know? _____

_____

8. Carol decided to start counting at 28 because that was the date today.

She counted by tens this time. What comes next?

28, _____, _____, _____, _____, _____, _____

9. Carol jumped rope five times. She skip counted by 100 as she jumped. Think about the numbers she called out. Which place changes and which places stay the same? Explain your answer. (NBT.1)

_____

_____

_____

Carol's Numbers - Part 3 – NBT 3

10 – 12. Help Carol write in expanded notation. Write the following numbers in expanded form. (ex. 496 = 400 + 90 + 6)

672 = _____

999 = _____

205 = _____

13. Write 500 + 5 in standard form. _____

14. How would you write 205 with words?

_____

Carol's Numbers - Part 4 – NBT 4

15 – 17. Carol and Mya collect stickers. They each have three books of stickers. They wrote down the number of stickers they had in each book.

Use the symbols <, >, and = to compare the number of stickers that they have.

CAROL'S STICKERS	>, <, or =	MYA'S STICKERS
345		342
99		102
580		508