TNCore

Mathematics Task Arcs

A task arc is a set of related lessons consisting of a series of instructional tasks and their associated lesson guides. The lessons are focused on a small number of standards within a domain of the Tennessee Academic Standards for Mathematics. In some cases a small number of related standards from more than one domain may be addressed.

Included in this task arc are a preview of the tasks and the content and practice standards associated with each task. Essential understandings which teachers strive to develop and solidify within their students across the arc are named in each lesson guide.

The tasks and lessons are sequenced in deliberate and intentional ways and are designed to be implemented consecutively and in their entirety. It is possible for students to develop a deep understanding of concepts because a small number of standards are targeted. Lesson concepts remain the same as the lessons progress; however, the context or representations may change.

Bias: Social, ethnic, racial, religious, and gender bias is best determined at the local level where educators have in-depth knowledge of the culture and values of the community in which students live. The TDOE asks local districts to review these curricular units for social, ethnic, racial, religious, and gender bias before use in local schools.

Grade 2: Number System and Place Value

A Set of Related Tasks and Lessons

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Introduction

Tasks and Lesson Guides

ARC OVERVIEW

This set of related tasks helps students to develop an understanding of place value, including modeling numbers with pictures and objects, understanding the value of each place, comparing numbers, skip counting within 1,000, and reading and writing numbers in word form. Students should use a variety of models, including base ten blocks and number lines, to demonstrate their understanding of place value and to compare numbers.

Task 1 focuses on skip counting within 1,000. If money standard 1.MD.6 hasn't been taught, this arc can be used, skipping task 1 and proceeding through tasks 2 – 6. Tasks 2 and 3 focus on representing numbers with base ten blocks. Task 4 focuses on reading numbers in word form and writing numbers in expanded form. Tasks 5 and 6 focus on creating and comparing numbers.

The Arc Preview table on page 4 provides all of the task questions contained in this arc. Note that the Essential Understandings listed in each task were taken from "Big Ideas and Understandings as the Foundation for Elementary and Middle School Mathematics."[1]. Tennessee State Mathematics Standards were retrieved from http://www.tn.gov/education/standards/math.shtml. These tasks are aligned to the 2.NBT.1 through 2.NBT.4 Tennessee State Standards for Mathematics.

Through engaging in the lessons in this set of related tasks students will:

- Skip count by 5s and 10s within 1,000
- Apply skip counting skills to money
- Write numbers in expanded form
- Create and compare two- and three-digit numbers using base ten blocks, words, and symbols
- Critique representations of three-digit numbers shown as base ten blocks
- Sort numbers by student-chosen attributes
- Understand the role of place value in comparing three-digit numbers
- Read numbers in word form and write numbers in expanded form

By the end of these six tasks, students will be able to answer the following overarching questions:

- What patterns in numbers do you recognize when skip counting by 5s and 10s?
- How does building numbers with base ten blocks help you understand the value of numbers?
- What is similar about word form and expanded form?
- What strategies work when creating the largest and smallest three-digit numbers?
- What strategies work when creating and comparing three-digit numbers?

[1] Charles, Randall I. "Big Ideas and Understandings as the Foundation for Elementary and Middle School Mathematics." *Journal of Mathematics Education Leadership* 7.3 (2005) : 9-24. Print.

The assessing questions, advancing questions, and whole group questions provided in this guide will ensure that students are working in ways aligned to the Standards for Mathematical Practice. Although the students will not be aware that this is occurring, the teacher can guide the process so that each MP (Mathematical Practice) is covered through good explanations, understanding of context, and clarification of reasoning behind solutions.

Arc Preview

<table>
<tr>
<td>Task 1: The Birthday Scarf
Maggie wanted to buy her mother a scarf for her birthday that costs $9.00. She emptied her piggy bank to see how much money she had. She sorted her coins and had a 39 dimes and 57 nickels.

a) How much money did she have in dimes in all?
b) How much money did she have in nickels in all?
c) Does Maggie have enough money to buy the scarf? Model using numbers, illustrations, and words to explain your thinking and tell how skip counting can help you solve this problem.</td>
<td>Goals for Task 1:
• Skip count by 5s and 10s within 1,000
• Apply skip counting skills to money

Standards for Task 1:
2.NBT.2 Count within 1000; skip-count by 5s, 10s, and 100s.

2.MD.6 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?</td>
</tr>
<tr>
<td>Task 2: How Many Ways?
Autumn was creating numbers using base ten blocks. She used 13 blocks to create the numbers.

a) List at least four two-digit numbers she could have created with the 13 blocks and draw a representation of the base ten blocks used to create each of the two-digit numbers.

b) List at least four three-digit numbers she could have created with the 13 blocks and draw a representation of the base ten blocks used to create each of the three-digit numbers.</td>
<td>Goals for Task 2:
• Create two- and three-digit numbers using base ten blocks
• Count base ten blocks to determine the number they represent

Standards for Task 2:
2.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).

2.NBT.3 Read and write numbers to 1,000 using base-ten numerals, number names, and expanded form.</td>
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Task 3: Building Numbers with Base Ten

Brandon, Austin, and Emily are building the number 435 using base ten blocks. Each has displayed the number in different ways.

Brandon's Representation

Austin's Representation

Emily's Representation:

1. Is each representation correct or incorrect? Explain your answer?
    a) Brandon:
    b) Austin:
    c) Emily:

a) Is there another way to represent the number 435? Explain.

Goals for Task 3:

- Critique representations of three-digit numbers shown as base ten blocks
- Realize that ten ones is a "ten"
- Create different ways of representing a number using base ten blocks

Standards for Task 3:

2.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).

Task 4: Number Word Sort

Brandon was helping his teacher sort some number word flash cards.

a) Sort the cards into different piles. Write a sentence explaining the rule you used to sort the cards. Make a list that shows how you sorted your cards. Write the number in standard form and expanded form beside each word form.
b) Re-sort the number word cards a second time using a different rule. Write a sentence explaining the rule you used to sort the cards. Make a list that shows how you sorted your cards. Write the number in standard form and expanded form beside each word form.

Goals for Task 4:

- Connect the word form of numbers with the numeric form
- Sort numbers by student-chosen attributes
- Write numbers in expanded form

Standards for Task 4:

2.NBT.3 Read and write numbers to 1,000 using base-ten numerals, number names, and expanded form.

Task 5: Comparing 3-digit numbers

Create 3-digit numbers, using the digits 3, 0, 5, and 8, that make each of the following comparisons true. You may use the digits more than once. Use place value to explain how you know each comparison is true.

a) _____ _____ _____ **>** _____ _____ _____

b) _____ _____ _____ **<** _____ _____ _____

c) _____ _____ _____ **=** _____ _____ _____

.

Goals for Task 5:

- Create and compare three-digit numbers using symbols
- Reason about number comparisons using place value concepts

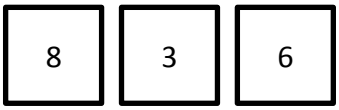
Standards for Task 5:

2.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.

•

Task 6: Creating Largest and Smallest Numbers

Jason was given three number cards: 8, 3, and 6.



a) What is the largest three-digit number Jason could make using the given number cards? Write it in numerals, words and expanded form. Explain how you know you created the largest three-digit number.
b) What is the smallest three-digit number Jason could make using the given number cards? Write it in numerals, words and expanded form. Explain how you know you created the smallest three-digit number.
c) Write a correct comparison of your two numbers using symbols.

Goals for Task 6:

- Create three-digit numbers
- Understand the role of place value in comparing three-digit numbers
- Solidify understanding of place value for three-digit numbers

Standards for Task 6:

2.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).

2.NBT.3 Read and write numbers to 1,000 using base-ten numerals, number names, and expanded form.

2.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 comparison.

Tennessee State Standards Alignment

Task	2.NBT.1	2.NBT.2	2.NBT.3	2.NBT.4	2.MD.6	MP 1	MP 2	MP 3	MP 4	MP 5	MP 6	MP 7	MP 8
Task 1 **The Birthday Scarf**		✔			✔	✔	✔		✔		✔	✔	✔
Task 2 **How Many Ways?**	✔		✔			✔	✔		✔	✔	✔	✔	
Task 3 **Building Numbers with Base Ten**	✔					✔	✔	✔	✔		✔		
Task 4 **Number Word Sort**			✔			✔	✔	✔	✔		✔	✔	
Task 5 **Comparing Three-Digit Numbers**				✔		✔	✔	✔	✔		✔		
Task 6 **Creating and Largest and Smallest Numbers** *Solidifying*	✔		✔	✔		✔	✔	✔	✔		✔		

The 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.

Name _____

Task 1: The Birthday Scarf

Maggie wanted to buy her mother a scarf for her birthday that costs $9.00. She emptied her piggy bank to see how much money she had. She sorted her coins and had 39 dimes and 57 nickels.

a) How much money did she have in dimes?

b) How much money did she have in nickels?

c) Does Maggie have enough money to buy the scarf? Explain your thinking and tell how skip counting can help you solve this problem.

Tennessee Department of Education: Lesson Guide 1

Task 1: The Birthday Scarf	**Grade 2**
Maggie wanted to buy her mother a scarf for her birthday that costs $9.00. She emptied her piggy bank to see how much money she had. She sorted her coins and had 39 dimes and 57 nickels. a) How much money did she have in dimes? b) How much money did she have in nickels? c) Does Maggie have enough money to buy the scarf? Explain your thinking and tell how skip counting can help you solve this problem.	
Teacher Notes:	
If 2.MD.6 has not been covered, task 1 may be omitted from this arc. Students will need to know that dimes are worth $.10 and nickels are worth $.05. They will also need to understand that $9.00 would be the same as 900 cents. If students struggle with this task, have counters to represent dimes and nickels available.	
Tennessee State Standards for Mathematical Content	**Tennessee State Standards for Mathematical Practice**
2.NBT.2 Count within 1000; skip-count by 5s, 10s, and 100s. **2.MD.6** Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*	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.
Essential Understandings:	
• A dime is worth 10 cents; a nickel is worth 5 cents. • Skip counting on the number line generates number patterns. • Skip counting by tens when starting at zero generates numbers that end in a zero in the ones place. • Skip counting by fives starting at zero generates numbers that end in either a zero or a five in the ones place.	

Explore Phase	
Possible Solution Paths	**Assessing and Advancing Questions**
a) Students skip count by 10s until they get to 100, recognizing that this is a dollar. They continue counting by 10s, making additional dollars. They would then count their groups of hundreds (dollars) and then add in the leftover tens (90 cents).	**Assessing Questions:** • When skip counting by tens, what do you notice about the numbers? **Advancing Questions:** • How many dimes does Maggie have? • How much is a dime worth? Two dimes? Three dimes? Ten dimes? • Do you know a quick way to count by tens?
b) Students might skip count by 5s until they get to 100, recognizing that this is a dollar. They continue counting by 5s, making additional dollars. They would then count their groups of hundreds (dollars) and then add in the leftover 5s (85 cents).	**Assessing Questions:** • When skip counting by tens, what do you notice about the numbers? • If you had more nickels, then why is your total for nickels a smaller number than your total for dimes? Explain. **Advancing Questions:** • How many nickels does Maggie have? • How much is a nickel worth? Two nickels? Three nickels? Twenty nickels? • Do you know a quick way to count by fives?
c) Students recognize they have to combine dimes and nickels. Since there were 390 dimes, student would start skip counting by fives with 390, 395, 400, recognizing that 400 is $4. They continue counting by 5s, making additional dollars. They would then count their groups of hundreds (dollars) and then add in the leftover 5s (75 cents). They would determine that they did not have enough money to purchase the scarf. Alternately student may start with 285 nickels and skip count by 10s.	**Assessing Questions:** • How did you know how to combine your dimes and nickels? **Advancing Questions:** • How many dimes does Maggie have? Can you start with that number and count the nickels from there?
Part c) alternate path: Students might utilize a thousand chart and skip count by ten 39 times, landing on 390. The student might even lay one dime on each square on the thousand chart until they ran out of the 39 dimes. The last dime would land on the number 390. Some students might continue using the thousand chart, but would lay two nickels on each square, making a ten. They would have enough nickels to place two on each square through the number 670. They would then only have one nickel left for a total of 675.	**Assessing Questions:** • What pattern do you notice on a thousand chart? • Can you explain why you used the thousand chart? **Advancing Questions:** • Can you use a thousand chart to answer part c)? • What is the difference between a hundred chart and a thousand chart? • What do you skip count by on a hundred chart? What do you skip count by on a thousand chart? • How many dimes go on each space of the thousand chart?

	• How many nickels go on each space of a thousand chart? • How much is one row of the thousand chart worth?
Part c) alternate path: Students might draw 39 dimes and place two "tick-marks" on each dime. They would also draw 57 nickels and place one "tick-mark" on each nickel. The students would then skip count by 5's for each "tick-mark" drawn on the coins, recognizing that each 100 count is another dollar. They would come up with a total of 675 or $6.75.	**Assessing Questions:** • Why did you draw one "tick-mark" on each nickel? Why did you draw two "tick-mark" on each dime? • Can you explain why you skip counted different coins with different values by fives? • Can you explain how you solved the problem to a friend?
Possible Student Misconceptions	**Assessing and Advancing Questions**
Students might skip count by 10s up to 190 correctly, and then write the next number incorrectly (or skip count by 5s to 195, and then write the next number incorrectly).	• Can you count aloud from 195? What is the fifth number you say aloud?
Students might skip count correctly by 10s coming up with $3.90 and then by 5s, coming up with $2.85, but then combine the coins incorrectly.	• How many dimes does Maggie have? Can you start with that number and count the nickels from there? • Is there a way to combine the coins with skip counting rather than by addition?
Entry/Extensions	**Assessing and Advancing Questions**
If students can't get started….	• How much is a dime worth? How much is a nickel worth? • Can you take a hundred chart and color every 5^{th} number? What do you notice about the squares you colored? • Can you take a hundred chart and color every 10^{th} number? What do you notice about the squares you colored? • How is skip counting by tens similar to counting and working with base tens blocks? • When you skip count by 10s, does the number change in the ones place? Tens place? Will this ever change in the hundreds place? • Can you use a thousand chard, which skip counts by 10s, to help you solve this task? Explain.
If students finish early….	• Can you make a number line that skip counts by fives? By tens? By hundreds? • Can you skip count by 10 to 1,000 with a friend? • Can you skip count by 5 to 1,000 with a friend? • If Maggie only had dimes in her piggy bank, how many would she need in order to buy the scarf?
Discuss/Analyze	

Whole Group Questions
• What did you learn from this task? • Why is skip counting important when counting money? • When skip counting by 10s, what number comes after 190? Explain. • Can someone explain to the class how you combined the dimes and nickels? Did anyone do it differently? • What patterns did you notice in the numbers as you were skip counting? • What are some real-life examples of when we would skip count by 2s? 3's? 5's, 10s? 100s? • Can you create a number line skip counting by 10s? 100s?

Name _____

Task 2: How Many Ways?

Autumn was creating numbers using base ten blocks. She used 13 blocks to create the numbers.

a) List at least four two-digit numbers she could have created with the 13 blocks and draw a representation of the base ten blocks used to create each of the two-digit numbers.

b) List at least four three-digit numbers she could have created with the 13 blocks and draw a representation of the base ten blocks used to create each of the three-digit numbers.

Task 2: How Many Ways?	**Grade 2**
Autumn was creating numbers using base ten blocks. She used 13 blocks to create the numbers. a) List at least four two-digit numbers she could have created with the 13 blocks and draw a representation of the base ten blocks used to create each of the two-digit numbers. b) List at least four three-digit numbers she could have created with the 13 blocks and draw a representation of the base ten blocks used to create each of the three-digit numbers.	
Teacher Notes:	
If your students are challenged to find numerous solutions, encourage them to create their numbers using an organized system. It is not the design of the task to limit students to rods and units when creating three-digit numbers. However, if students are overwhelmed by the number of possible answers, you may do so.	
Tennessee State Standards for Mathematical Content	**Tennessee State Standards for Mathematical Practice**
2.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). **2.NBT.3** Read and write numbers to 1,000 using base-ten numerals, number names, and expanded form.	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.
Essential Understandings:	
• Numbers can be represented using objects, words, and symbols. • For any number, the place of a digit tells how many ones, tens, hundreds, and so forth are represented by that digit. • Sets of ten, one hundred and so forth must be perceived as single entities when interpreting numbers using place value. • Numbers can be named in equivalent ways using place value. • You can add the value of the digits together to get the value of the number. • Skip counting on the number line generates number patterns.	
Explore Phase	
Possible Solution Paths	**Assessing and Advancing Questions**
a) Students will find at least four two-digit numbers using exactly 13 base ten blocks. Students will record the numbers and draw correct representations. Students' combination of rods and units should not exceed 99.	**Assessing Questions:** • Could you count out loud the base ten blocks you used to show your first number? • Can you explain how you came up with your other solutions? • Did you find all the possible solutions? How do you know? • Is it possible to create a two-digit number with 13 base ten blocks using no units? Explain.

	Advancing Questions: • Can you name some two-digit numbers? Could you write them on a place value chart? How would you represent them with base ten blocks?
b) Students will find at least four three-digit numbers using exactly 13 base ten blocks. Students will record the numbers and draw correct representations. Students' combination of flats, rods, and units should not exceed 999.	**Assessing Questions:** • Could you count aloud the base ten blocks you used to show your first number? • Can you explain how you came up with your other solutions? • Did you find all the possible solutions? How do you know? • Is it possible to create a three-digit number with 13 base ten blocks using no tens or units? Explain. **Advancing Questions:** • Can you name some three-digit numbers? Could you write them on a place value chart? How would you represent them with base ten blocks?
Possible Student Misconceptions	**Assessing and Advancing Questions**
Students are unable to find four two-digit numbers or three-digit numbers.	• Could you trade one of your base ten blocks in your solution for a different base ten block and still create a two-digit number? Could you continue to make trades this way to look for other solutions?
Students might create a two digit number using 1 ten and 3 ones, which totals 13, but does not meet the criteria of using 13 base ten blocks.	• Could you count aloud the base ten blocks you used to show your number? Now count how many blocks you used to create this number. Did you use 13 base ten blocks?
Entry/Extensions	**Assessing and Advancing Questions**
If students can't get started….	• Could you write some examples of what a two-digit number looks like? A three-digit number? • What does each base ten block represent? How much is a unit? A rod? A flat? • What number do you create if you use only units? Is this a two-digit number? • What number do you create if you use only tens? Does that solution work to create a two-digit number? Does that solution work to create a three-digit number?
If students finish early….	• What would be different if the problem asked you to create a two-digit number using only 8 blocks? • What numbers could you create if the problem said to create a three-digit number using 13 tens and/or hundreds only (no ones)?

	• Can you write the number created in expanded form? How does counting the base ten blocks used help you to write the number in expanded form? • Can you find all the possible three-digit numbers? How do you know you have them all? • Can you put the numbers you created on a number line? • Can you explain to a friend how you found your solutions and count the base ten blocks aloud to them?

Discuss/Analyze

Whole Group Questions

- Ask students to share and explain possible solutions. Ask if others found alternate solutions. If so, have them model and explain.
- Can you explain how you formed your two-digit numbers? Did someone use a different strategy?
- Can you explain to others what they should think about if they are stuck on this problem.
- What base ten blocks did you use in forming two-digit numbers? How did you know to use these?
- What base ten blocks did you use in forming three-digit numbers? How did you know to use these?
- Can someone explain the similarities between a place value chart and the base ten blocks? Differences?

Name_____

Task 3: Building Numbers with Base Ten

Brandon, Austin, and Emily are building the number 435 using base ten blocks. Each has displayed the number in different ways using the following blocks.

 = 100  = 10  = 1

Brandon's Representation

Austin's Representation

Emily's Representation

1. Is each representation correct or incorrect? Explain your answer.

   a. Brandon:

   b. Austin:

   c. Emily:

2. Is there another way to represent the number 435? Explain.

Task 3: Building Numbers with Base Ten	**Grade 2**

Brandon, Austin, and Emily are building the number 435 using base ten blocks. Each has displayed the number in different ways.

Brandon's Representation

Austin's Representation

Emily's Representation

1. Is each representation correct or incorrect? Explain your answer?
   a) Brandon:
   b) Austin:
   c) Emily:
2. Is there another way to represent the number 435? Explain.

Teacher Notes:

Tennessee State Standards for Mathematical Content	**Tennessee State Standards for Mathematical Practice**
2.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).	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.

Essential Understandings:

- Numbers can be represented using objects, words, and symbols.
- For any number, the place of a digit tells how many ones, tens, hundreds, and so forth, are represented by that digit.
- Sets of ten, one hundred and so forth must be perceived as single entities when interpreting numbers using place value.
- Numbers can be named in equivalent ways using place value.

Explore Phase	
Possible Solution Paths	**Assessing and Advancing Questions**
Problem 1: Students indicate that Austin and Emily both have correct representations using base ten blocks, explaining that the only difference is that Austin used 4 hundreds, 3 tens and 5 ones and Emily used 4 hundreds, 2 tens and 15 ones, since 15 ones is the same as one ten and five ones. Students indicate that Brandon's representation is incorrect because it does not show the value since he only used ones to create his number. Brandon's blocks represent the number 12.	**Assessing Questions**: • Can you tell me how Austin's representation is different than Emily's? • Why can both representations be considered correct? • What number did Brandon represent using base ten blocks? **Advancing Questions:** • What number does the flat represent? The rod? The unit? • Can you count the value of Brandon's blocks based on each block's value? • Are there multiple ways of representing this number using base ten blocks? • Why would you want to be able to represent a number in different ways using base ten blocks?
Problem 2: Students may create 435 by using ten rods for one flat or ten units for one rod in any combination that totals 435.	**Assessing Questions:** • How do you know you have created 435? **Advancing Questions:** • Can you tell me how Austin's representation is different than Emily's? • What number does the flat represent? The rod? The unit?
Possible Student Misconceptions	**Assessing and Advancing Questions**
Students might use only ones to represent each digit.	• Can you read the number 435 aloud to me? Does what you read match the amount shown by Brandon? Where is the 400 in his representations? Where is the 30? Where is the 5? • Can you show me the ones place, tens place, and hundreds place? • Which base ten manipulative is used to show ones? Tens? Hundreds?
Students might not see that 3 tens and 5 ones is the same value as 2 tens and 15 ones.	• Can you add the blocks together and tell me what each totals? • If Austin's and Emily's blocks were different, but each still totaled 435 after counting, can they both be correct?
Entry/Extensions	**Assessing and Advancing Questions**
If students can't get started….	• What is something you know about this problem? • Can you read the number aloud? • Could you build a smaller number (tens and ones only) using base ten blocks?

	• How many ones make up a ten? • How many tens make up a hundred?
If students finish early….	• What have you learned from this task? • What do you still not understand about place value? • If you did not have any tens in your base ten block set, how could you build this number using just hundreds and ones? • Why is understanding that the three digits of a three-digit number represent amounts of hundreds, tens, and ones important?
Discuss/Analyze	
Whole Group Questions	
• Can anyone tell the class how Austin's representation is different than Emily's? • Is Austin's representation more efficient than Emily's? Why or why not? • What might be a reason Emily showed her number in a different way? • Did anyone think that after finding one correct answer all the others must be wrong? Why or why not? • What have we learned before that was useful in helping solve this problem? • How can you make a connection with this problem and money? Explain. • If you were making 35 cents with coins, what are some ways to do that using coins? • Can you find this number on a thousands chart? Show on a number line?	

Name_____

Task 4: Number Word Sort

Brandon was helping his teacher sort some number word flash cards.

a) Sort the cards into different piles. Write a sentence explaining the rule you used to sort the cards. Make a list that shows how you sorted your cards. Write the number in standard form and expanded form beside each word form.

b) Re-sort the number word cards a second time using a different rule. Write a sentence explaining the rule you used to sort the cards. Make a list that shows how you sorted your cards. Write the number in standard form and expanded form beside each word form.

Cut apart the number word cards below to use for the task above.

four	sixteen	twenty-three
twelve	eighty-five	three hundred twenty-one
twenty	nineteen	thirty-three
one	Forty-four	six hundred seventy-four
forty	twenty-two	ninety-nine
two hundred thirty-two	six	five hundred seventy-nine
seventy-five	sixty-five	seventy-seven
thirteen	fifteen	nine hundred twenty-eight

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Task 4: Number Word Sort	**Grade 2**
Brandon was helping his teacher sort some number word flash cards. a) Sort the cards into different piles. Write a sentence explaining the rule you used to sort the cards. Make a list that shows how you sorted your cards. Write the number in standard form and expanded form beside each word form. b) Re-sort the number word cards a second time using a different rule. Write a sentence explaining the rule you used to sort the cards. Make a list that shows how you sorted your cards. Write the number in standard form and expanded form beside each word form.	
Teacher Notes:	
As students sort the cards, encourage them to think about the number of digits in the number as one sorting rule. If no student sorts by that rule, bring this up during whole group discussion. If students struggle, especially with recording their answers, teacher may choose to have students glue down the cards into distinct groups and write the number forms beside each word.	
Tennessee State Standards for Mathematical Content	**Tennessee State Standards for Mathematical Practice**
2.NBT.3 Read and write numbers to 1,000 using base-ten numerals, number names, and expanded form.	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.
Essential Understandings:	
• For any number, the place of a digit tells how many ones, tens, hundreds, and so forth, are represented by that digit. • You can add the value of the digits together to get the value of the number. • Numbers can be named in equivalent ways using place value.	
Explore Phase	
Possible Solution Paths	**Assessing and Advancing Questions**
Students sort the cards based on the number of words it contains.	**Assessing Questions:** • How can you state or write the rule that you used to sort? • What made you think of sorting the cards that way? Explain. • Are the numbers that are written using a single word name all single digit numbers? • Does sorting in this way help you in your thinking about writing number words correctly? How? **Advancing Questions:** • What do you notice about these two cards (while holding up one card with one word and another card with two words)?

	• Where does this card belong (holding up a third card with only one word on it)? • Can you sort the remaining cards similarly?
Students sort the cards depending on whether it is an even or an odd number.	**Assessing Questions:** • How did you think about these number words and know they were even or odd when they were not written in standard form? Explain. • How do you know a number is even? How do you know a number is odd? **Advancing Questions:** • What do you notice about these two cards (while holding up one card with an even number and another card with an odd number)? • Where does this card belong (holding up a third card with an odd number on it)? • Can you sort the remaining cards similarly?
Students sorts the cards depending on whether it contains a hyphen.	**Assessing Questions:** • How are the cards with a hyphen different from the cards without a hyphen? Explain. **Advancing Questions:** • What do you notice about these two cards (while holding up one card with a hyphen and another card without a hyphen)? • Where does this card belong (holding up a third card with a hyphen)? • Can you sort the remaining cards in a similar manner?
Possible Student Misconceptions	**Assessing and Advancing Questions**
Students will simply randomly alternate placing cards into two groups making two piles with equal number of cards in each pile.	• Can you explain the rule you used to sort the cards? What is unique about each group? • Did the task ask you to make two equal groups of number word cards? What did the task ask you to do with the cards? • Can you think of a way to sort the cards by some attribute into two groups? Show me.
Entry/Extensions	**Assessing and Advancing Questions**
If students can't get started….	• Can you read aloud each number word on the cards? • Can you write the standard form beside each number word? • What do you notice about the numbers once written in standard form?
If students finish early….	• Can you create a word sort using number word cards for the hundreds and thousands? • Can you look at a friend's sort and guess what rule they used to sort?

Discuss/Analyze
Whole Group Questions
Pick groups to share their work. Select a sequence that will progress students through higher order thinking. Highlight any sorting rules involving the number of digits or place value. • Were you able to connect what you know about doing word sorts in reading with doing word sorts in math? Explain. • What did you learn from this task? Explain. • Exchange word sorts with your elbow partner and explain each other's sorting rule. • Did you identify any patterns in the number words? Explain.

Name_____

Task 5: Comparing Three-Digit Numbers

Create three-digit numbers, using the digits 3, 0, 5, and 8, that make each of the following comparisons true. You may use the digits more than once. Use place value to explain how you know each comparison is true.

a) _____ _____ _____ > _____ _____ _____

b) _____ _____ _____ < _____ _____ _____

c) _____ _____ _____ = _____ _____ _____

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Task 5: Comparing Three-Digit numbers	**Grade 2**

Create three-digit numbers, using the digits 3, 0, 5, and 8, that make each of the following comparisons true. You may use the digits more than once. Use place value to explain how you know each comparison is true.

a) _____ _____ _____ > _____ _____ _____
b) _____ _____ _____ < _____ _____ _____
c) _____ _____ _____ = _____ _____ _____

Teacher Notes:

Depending on the ability of the students in the class, you may choose to have number cards printed and available for students to cut out and manipulate as they form the three-digit numbers.

Tennessee State Standards for Mathematical Content	**Tennessee State Standards for Mathematical Practice**
2.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.	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.

Essential Understandings:

- For any number, the place of a digit tells how many ones, tens, hundreds, and so forth are represented by that digit.
- Sets of ten, one hundred and so forth must be perceived as single entities when interpreting numbers using place value.
- A number to the right of another on the number line is the greater number.
- Numbers can be compared using greater than, less than, or equal.
- Whole numbers can be compared by analyzing corresponding place values.

Explore Phase

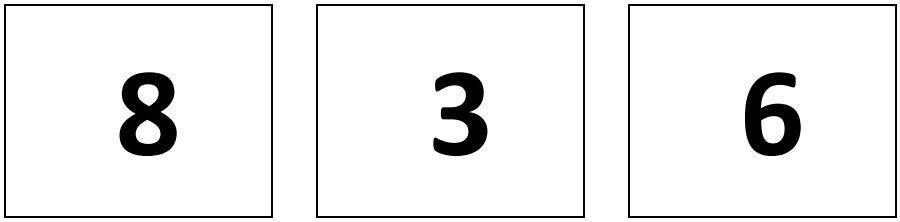
Possible Solution Paths	**Assessing and Advancing Questions**
Students create two three-digit numbers for each symbol, comparing them correctly using the symbols >, <, and =. Number possibilities are numerous, but each shows the chosen symbol to be true based upon comparisons using place value. Students should be able to explain that if the hundreds place is the same value, then look at the tens place. If the tens place is the same value, then comparison of the ones place would be necessary.	**Assessing Questions:** • Can you read the numbers, including the words naming the symbols, aloud? • Can you tell me how many hundreds, tens, and ones make up each number you compared? • How did you determine which was the greater/lesser number? **Advancing Questions:** • How would you know if a number is larger than another number? • Can you place both numbers on a number line and explain how this helps show if you used the comparing symbols correctly?

Possible Student Misconceptions	Assessing and Advancing Questions
Students create two 3-digit numbers that are exactly the same showing a correct example of the = symbol, but are unable to correctly show the same for the > and < symbol.	• What do you know about the symbols < and >? • Can you read the symbols aloud? • Can you read the numbers you created aloud, placing your finger under the numbers as you read? • Which digits should you use to compare these numbers?
Entry/Extensions	**Assessing and Advancing Questions**
If students can't get started….	• Can you create two two-digit numbers and use correct comparison symbols to write a comparison? • Can you show me where the two numbers would be on a number line? How do you know which number is larger? • Can you represent the numbers you created with base ten blocks? Which base ten blocks represent the ones? Tens? Hundreds?
If students finish early….	• Can you practice using comparing symbols using an online game at ABCya http://www.abcya.com/comparing_number_values_jr.htm Or at http://www.crickweb.co.uk/ks2numeracy-calculation.html#ncmenu • What does more mean? Can you list synonyms for more? • What does less mean? Can you list synonyms for less? • Could you create two four-digit numbers and compare them using the symbols >, <, and =? • Can you model these numbers using base ten blocks to show that you correctly used symbols when comparing the two numbers?
Discuss/Analyze	
Whole Group Questions	
• How does understanding place value help you to compare numbers? • When comparing numbers, is it best to start at the ones place or at the hundreds place? • Did anyone have a special strategy they used to compare numbers and if so, would you like to explain your thoughts to the class? • If I give you the number 421, can you fill in the blank (write on the board) 421 < ____ ? 421 > ____?	

Name_____

Task 6: Creating Largest and Smallest Numbers

Jason was given three number cards: 8, 3, and 6.



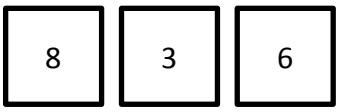
a) What is the largest three-digit number Jason could make using the given number cards? Write it in numerals, words, and expanded form. Explain how you know you created the largest three-digit number.

b) What is the smallest three-digit number Jason could make using the given number cards? Write it in numerals, words, and expanded form. Explain how you know you created the smallest three-digit number.

c) Write a correct comparison of your two numbers using symbols.

Task 6: Creating Largest and Smallest Numbers **Grade 2**

Jason was given three number cards: 8, 3, and 6.



a) What is the largest three-digit number Jason could make using the given number cards? Write it in numerals, words and expanded form. Explain how you know you created the largest three-digit number.

b) What is the smallest three-digit number Jason could make using the given number cards? Write it in numerals, words and expanded form. Explain how you know you created the smallest three-digit number.

c) Write a correct comparison of your two numbers using symbols.

Teacher Notes:

Students should use each card once and only once to create each number.

Tennessee State Standards for Mathematical Content	Tennessee State Standards for Mathematical Practice
2.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: c) 100 can be thought of as a bundle of ten tens — called a "hundred." d) 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). **2.NBT.3** Read and write numbers to 1,000 using base-ten numerals, number names, and expanded form. **2.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 comparison.	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.

Essential Understandings:

- Numbers can be represented using objects, words, and symbols.
- For any number, the place of a digit tells how many ones, tens, hundreds, and so forth, are represented by that digit.
- Sets of ten, one hundred and so forth must be perceived as single entities when interpreting numbers using place value.
- Numbers can be named in equivalent ways using place value.
- A number to the right of another on the number line is the greater number.
- Numbers can be compared using greater than, less than, or equal.
- Whole numbers can be compared by analyzing corresponding place values.
- You can add the value of the digits together to get the value of the number.

Explore Phase	
Possible Solution Paths	**Assessing and Advancing Questions**
a) Students place the 8 in the hundreds place, the 6 in the tens place, and the 3 in the ones place, creating 863, the largest possible number. The students then write "eight hundred sixty-three," showing word form, and "800 + 60 + 3," showing expanded form. Students are able to explain that placing the largest number in the hundreds place, then the next largest number in the tens place, and finally the smallest number in the ones place creates the largest number possible.	**Assessing Questions:** • How did you determine the number for the hundreds, tens, and ones? • How did you determine there was no number larger than the one you made? • Did you use base ten blocks to help you solve this problem? **Advancing Questions:** • Which is bigger 800 or 300? How can you tell?
b) Students place the 3 in the hundreds place, the 6 in the tens place, and the 8 in the ones place, creating the number 368, the smallest number. The students then write "three hundred sixty-eight," showing word form, and "300 + 60 + 8," showing expanded form. Students explain that placing the smaller digits in the greater place value helps create the smallest number possible. Therefore, placing the 3 in the hundreds place, the six in the tens place, and the 8 in the ones place.	**Assessing Questions:** • How did you determine the number for the hundreds, tens, and ones? • How did you check to determine there was no number smaller than the one you made? • Did you use base ten blocks to help you solve this problem? **Advancing Questions:** • Which is smaller 800 or 300? How can you tell?
c) 863 > 368 or 368 < 863	**Assessing Questions:** • Can you explain your answer? • Can you tell me how the largest number is different from the smallest number? **Advancing Questions:** • What do you know about the symbols < and >?
Possible Student Misconceptions	**Assessing and Advancing Questions**
a) and b) Students might place the largest (smallest) digit in the hundreds place, but then place the remaining two cards in no particular order, not realizing that you not only must create a number with the most (least) hundreds, but the most (least) tens and ones as well. (Creating number 836 for largest number instead of 863 or 386 for smallest instead of 368).	• Can you read the number aloud? • What is the problem asking you to do? • How do you know you have created the largest number? Smallest number? • If you swap the numbers in the ones place and tens place, is your number still the largest possible 3-digit number? Smallest 3-digit number? • What do you know about place value that will help you determine if you created the largest number? Smallest?

a) and b) Students put cards in order from largest to smallest (smallest to largest) but are unable to explain how they know it is the largest number. They are ordering numbers from biggest to smallest and do not understand that they represent hundreds, tens, and ones.	• How do you know you have created the largest number? Smallest number? • If you built the numbers using base ten blocks, which would create the most hundreds? Using the 8 in the hundreds? The 6 in the hundreds? Or the 3 in the hundreds? (Child chooses 8) Now what about the tens? Which would create the most tens? Using the 6 or the 3? • What do you know about place value that will help you determine if you created the largest number? Smallest?
c) Student incorrectly writes: 863 < 368 or 368 > 863	• Can you read this aloud?
Entry/Extensions	**Assessing and Advancing Questions**
If students can't get started….	• What is something you know about this problem? • Could you create the largest two-digit number using two number cards? Smallest two-digit number using two number cards? • What is the value of this place (teacher points at the hundreds place of a drawing on board with three blanks, such as ___ ___ ___)? • Can you use a place value chart to help you solve this problem?
If students finish early….	• How many different three-digit numbers can you create using these three number cards? • Would you use the same strategy if you were given 4 number cards to create the largest/smallest number possible? • If you could choose any three numbers to create the largest three-digit number, which numbers would you choose? Why?
Discuss/Analyze	
Whole Group Questions	
• What ideas have we learned before that were useful in helping solve this problem? • What do you know about hundreds, tens, and ones that helped you to work on this problem? • How did you form the largest number? How did you know it is the largest? • How did you form the smallest number? How did you know it is the smallest? Did anyone think of this a different way? • Would creating the largest four-digit number be a more difficult problem than creating the largest three-digit number? Why or why not?	