Mathematics Instructional Cycle Guide

2.NBT.4

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

Laury LaMarche, 2014 Connecticut Dream Team teacher

CT CORE STANDARDS

This Instructional Cycle Guide relates to the following *Standards for Mathematical Content* in the *CT Core Standards for Mathematics*:

Understand place value.

CCSS. Math.Content.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 the comparisons.

This Instructional Cycle Guide also relates to the following *Standards for Mathematical Practice* in the *CT Core Standards for Mathematics*:

MP. 2 Reason abstractly and quantitatively.
MP. 4 Model with mathematics

WHAT IS INCLUDED IN THIS DOCUMENT?

- A Mathematical Checkpoint to elicit evidence of student understanding and identify student understandings and misunderstandings. **(p. 2)**
- A student response guide with examples of student work to support the analysis and interpretation of student work on the Mathematical Checkpoint. **(pp. 3-8)**
- A follow-up lesson plan designed to use the evidence from the student work and address the student understandings and misunderstandings revealed. **(pp. 9-13)**
- Supporting lesson materials. **(pp.17-21)**
- Precursory research and review of standard **2.NBT.4** and assessment items that illustrate the standard. **(pp. 14-16)**

HOW TO USE THIS DOCUMENT

1) Before the lesson, administer **Comparing Numbers** ***Mathematical Checkpoint*** individually to students to elicit evidence of student understanding.
2) Analyze and interpret the student work using the ***Student Response Guide.***
3) Use the next steps or ***follow-up lesson plan*** to support planning and implementation of instruction to address student understandings and misunderstandings revealed by the Mathematical Checkpoint.
4) Make instructional decisions based on the checks for understanding embedded in the follow-up lesson plan.

MATERIALS REQUIRED

- **paper**
- **pencil**
- **student white boards**
- **markers with erasers**
- **crayons**
- **place value charts**
- **dice**
- **answer sheets**

TIME NEEDED

Comparing Numbers administration: 20 minutes
Follow-Up Lesson Plan: 45 minutes

Timings are only approximate. Exact timings will depend on the length of the instructional block and needs of the students in the class.

Step 1: Elicit evidence of student understanding		
Mathematical Checkpoint		
Question(s)	**Purpose**	
Student Checkpoint Compare the numbers below. Write <, > or = on the line to complete the sentence. **379 ____ 419** **949 ____ 941** **622 ____ 622** Below, circle **True** if the number statement is true or **False** if the number statement is false. **334 > 357** **True** **False** **Explain your thinking in the box below.** Compare the numbers below: **314 413** **Circle the number that is greater. Explain below how you know that this number is greater than the other number. You can use words or pictures to help you.**	**CT Core Standard:**	**2.NBT.4** Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits using symbols (>, =, <) to record the results of comparisons.
	Target question addressed by this checkpoint:	• Do students understand how a digit's position affects its value? • Can students recognize equivalent numbers when comparing two numbers? • How do students know that a three digit number is greater than another three digit number when comparing two numbers?

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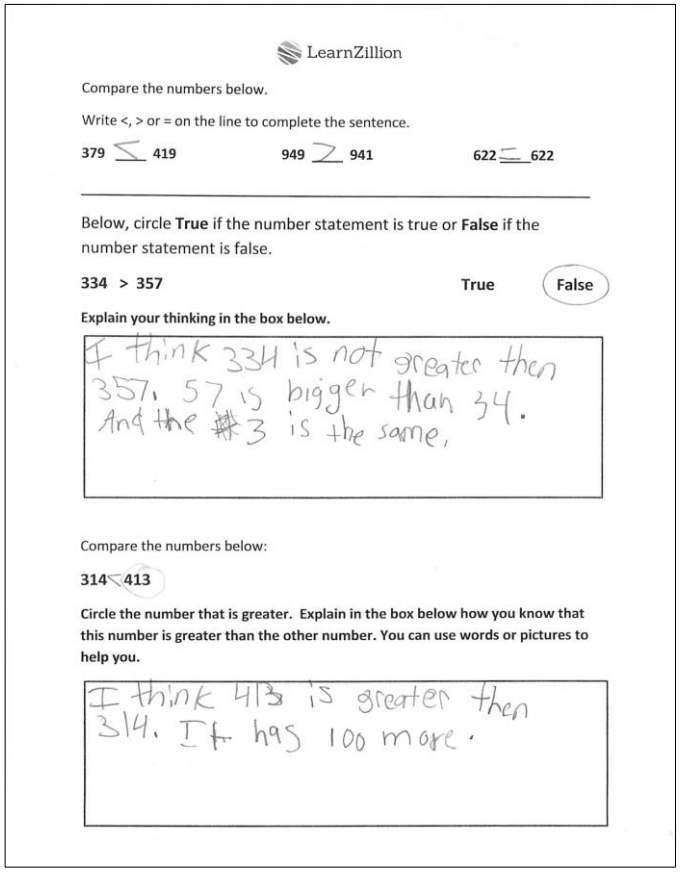
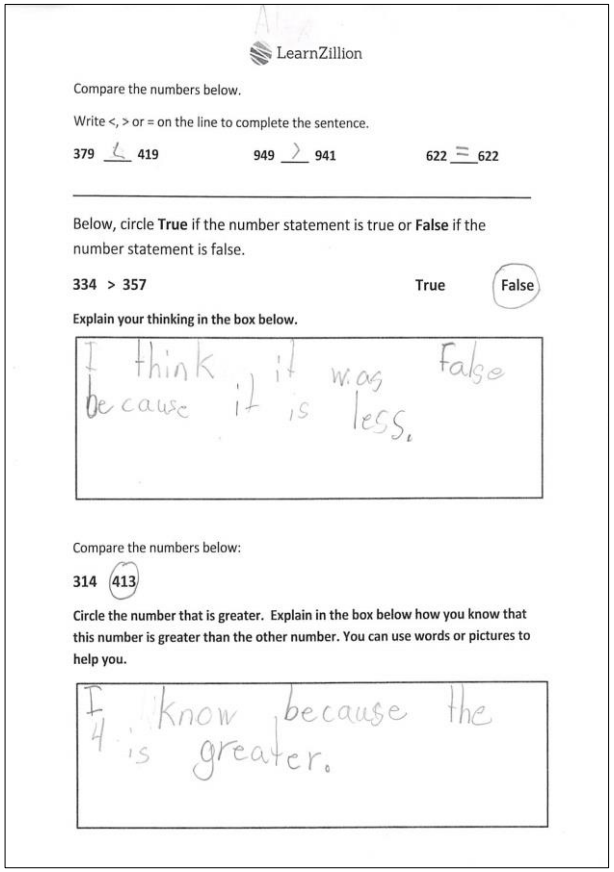
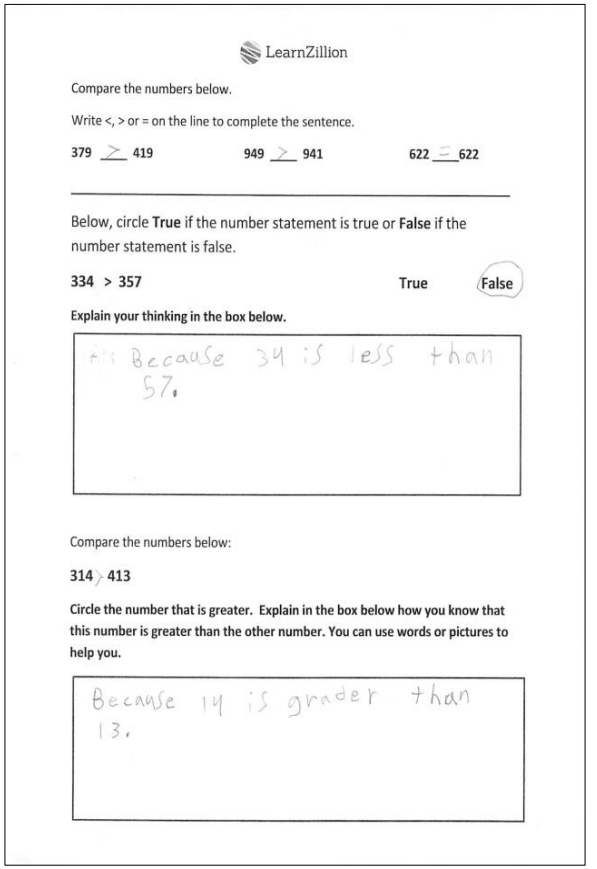
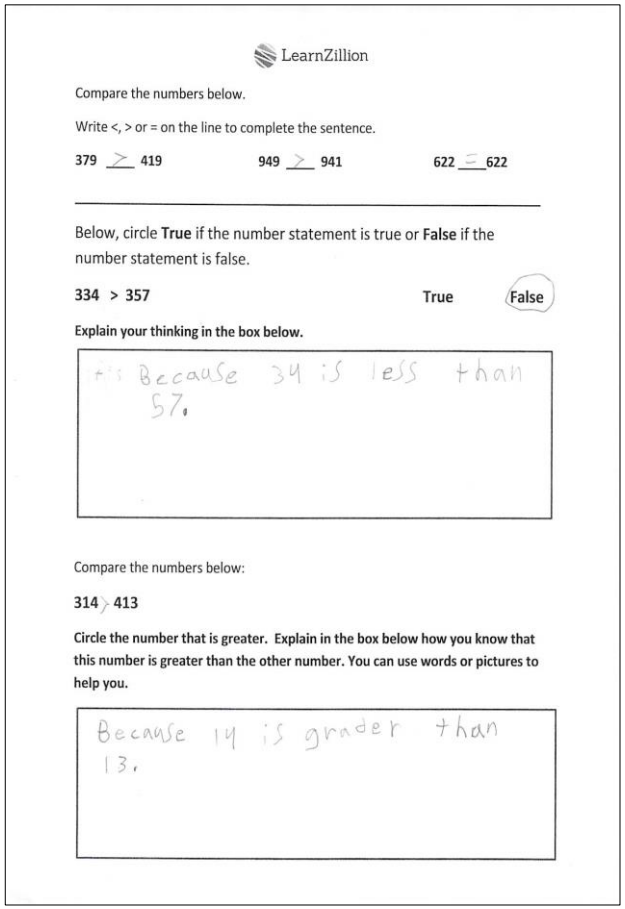
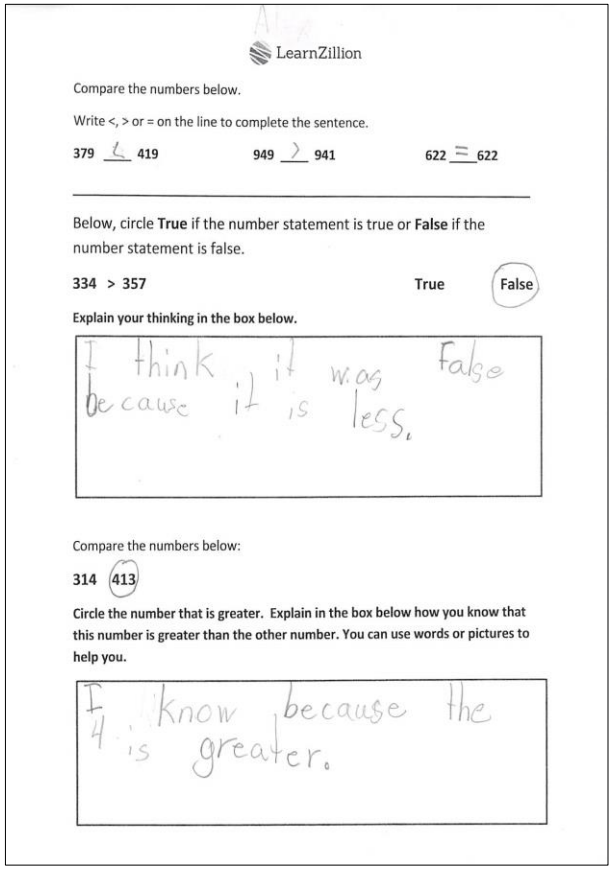
Step 2: Analyze and Interpret Student Work

Student Response Guide

Got It	Developing	Getting Started
		

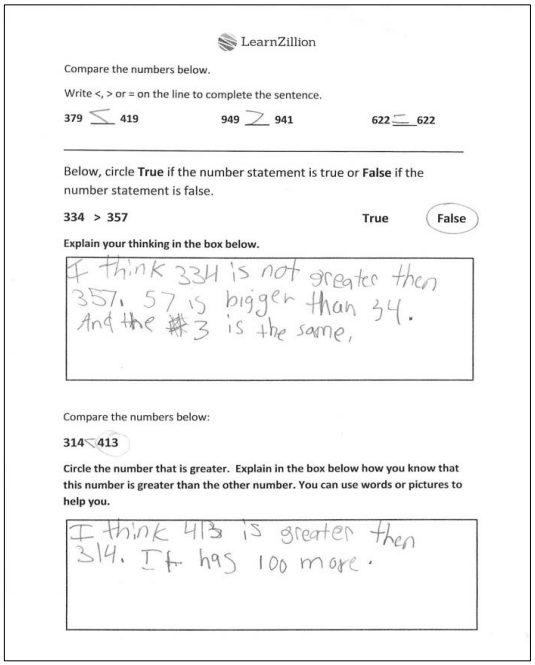
Getting Started	
Student Response Example	**Indicators**
 LearnZillion Compare the numbers below. Write <, > or = on the line to complete the sentence. 379 > 419 949 > 941 622 = 622 Below, circle **True** if the number statement is true or **False** if the number statement is false. 334 > 357 True (False) **Explain your thinking in the box below.** It's Because 34 is less than 57. Compare the numbers below: 314 > 413 **Circle the number that is greater. Explain in the box below how you know that this number is greater than the other number. You can use words or pictures to help you.** Because 14 is grader than 13. • The student did not understand that the hundreds place value was the determining factor when comparing two three-digit numbers. • The student did not understand the symbols < and >. He did know that = represented equal to. • The student was able to articulate that 334 was not greater than 357 but could not tell why.	• Student may not understand what the symbols <, >, =, represent. • Students may not be able to apply their understanding of place value within hundreds, tens and ones. • Students may not understand the value of a number's value based on the digit's position. • Students may have difficulty recognizing that zero has value in a 3 digit number.

In the Moment Questions/Prompts	Closing the Loop (Interventions/Extensions)
Q: What digits do we look at when comparing two numbers? Q: Can you explain how these two numbers are alike or different? How do you know? Q: Which number is in the hundreds place? Q: Why did you start with that position? Q: What do we do if the digits are the same? Q: What does the symbol > represent? Q: What does the < symbol represent? Q: What does the = symbol represent?	Use flats, ten rods and ones cubes to model 3 digit numbers • **https://learnzillion.com/lessons/3678-compare-numbers-using-arrow-cards** • **http://learnsillion.com/lessons/3294-understanding-the-value-of-a-number**

Developing	
Student Response Example	**Indicators**
	• Student has understanding of the representations of hundreds, tens and ones. • Student may have understanding of the place value system but cannot explain their thinking as to why a number is greater than or less than. • Student may have only looked at the hundreds place value in the last sample question. • Student may not understand the value of a 3 digit number.

The student understood the symbols, <, >, = were used for comparing numbers. When comparing two numbers, the student knew that a number was larger but could not explain why and may not understand place value.

In the Moment Questions/Prompts	*Closing the Loop (Interventions/Extensions)*
Q: What is the value of 3 in the number 314? Q: What is the value of 1 in the number 314? Q: What is the value of 4 in the number 314? Q. Can you show me 314 with place value flats, rods or cubes? Q: What is the value of these numbers 314 to 413?	Use hundreds flats, tens rods and ones cubes to represent 3 digit numbers. Use numbers lines or 100s charts to show three digit numbers. ***https://learnzillion.com/lessons/3677-compare-two-3digit-numbers-by-comparing-number-parts***

<table>
<tr><th colspan="2">Got it</th></tr>
<tr><th>Student Response Example</th><th>Indicators</th></tr>
<tr><td>

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Compare the numbers below.
Write <, > or = on the line to complete the sentence.
379 < 419 949 > 941 622 = 622
Below, circle True if the number statement is true or False if the number statement is false.
334 > 357 True False
Explain your thinking in the box below.
I think 334 is not greater then 357. 57 is bigger than 34. And the #3 is the same.
Compare the numbers below:
314 < 413
Circle the number that is greater. Explain in the box below how you know that this number is greater than the other number. You can use words or pictures to help you.
I think 413 is greater then 314. It has 100 more.

The student understood how to compare two numbers by looking at the place value of hundreds, tens and then ones place values. The student understood that the symbols <, >, = represented greater than, less than and equal to.
</td><td>

Student understands the place value of hundreds, tens and ones.
Student uses the symbols <, >, =, correctly.
Students can explain their thinking when comparing 3 digit numbers.

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<tr><th>In the Moment Questions/Prompts</th><th>Closing the Loop (Interventions/Extensions)</th></tr>
<tr><td>
Q: Which number is greater? By how much?

Q: How do you know which number (314 or 413) is greater and why?
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https://learnzillion.com/lessons/3678-compare-numbers-using-arrow-cards

https://learnzillion.com/lessons/3676-compare-numbers-using-a-number-chart-and-counting-sequence
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Steps 3 and 4: Act on Evidence from Student Work and Adjust Instruction	
Lesson Objective:	**Students will understand 3 digit place value by identifying what each number represents in a 3 digit number.**
Content Standard(s):	**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.**
Targeted Practice Standard :	**MP. 2 Reason abstractly and quantitatively** **MP. 4 Model with mathematics**

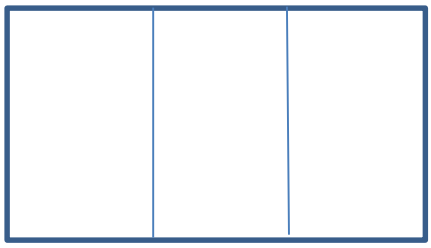
Mathematical Goals	Success Criteria
• ***Understand that the digits in a 3 digit number represent different values depending on their position in a number.*** • ***Understand what the symbols <, >, = represent***	• **Students will use a number line, a picture or a base ten model to depict the value of a number.** • **Students will explain that the position of a number gives it its value.**

Launch (Probe and Build Background Knowledge)

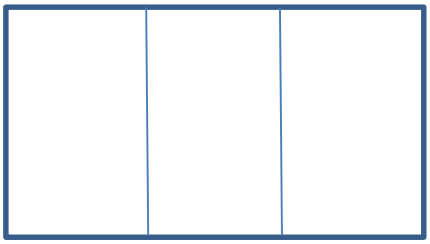
Purpose: Engage students in modeling with pictures, the value of a 3 digit number and then when comparing the two numbers, determine which number is greater, less than or equal.

Instruct students to use their place value chart to represent the 3 digit number: Draw flats, rods and cubes for your representation.

345



243



Turn and tell your table buddy how many hundreds are in 345. The teacher will circulate around the groups to observe the charts. Have a template on the white board. When students have completed this task, ask for volunteers to share at the board and explain their thinking.

Questions and prompts may include:

Who can show how they represented 345 in the chart?
Who can show how they represented 243 in the chart?
How does the number in the hundreds look different than the number in the tens?
How does your work help us when comparing two numbers?
Which place in the chart has the greatest value? Why?
Ask, “What is the greatest number 345 or 243?
Which number is less 243 or 345? How can you tell?

Instructional Task

Play a dice game by rolling 3 dice at once to determine which digit will be in the 100's place then the 10's and 1's place. Record the numbers and use the correct sign to represent greater than, less than or equal to.

Roll your dice and put them in order to create the greatest number. For example, if you roll a 2, 1, and 6 you would write 621 not 126 or 216.

Player 1	**<, >, =** **Greater than or less than** **Remember: The alligator eats the biggest number.**	**Player 2**

Look at your last round. Circle the greater number. Be sure to explain why.

Purpose: Order numbers from greatest to least. Then compare two 3 digit numbers.

Engage (Setting Up the Task)
Use concrete or visual base ten blocks to represent a model of the following numbers. 506, 467, and 604. Record the numbers in their math journals.

Use the following questions to facilitate discussion:

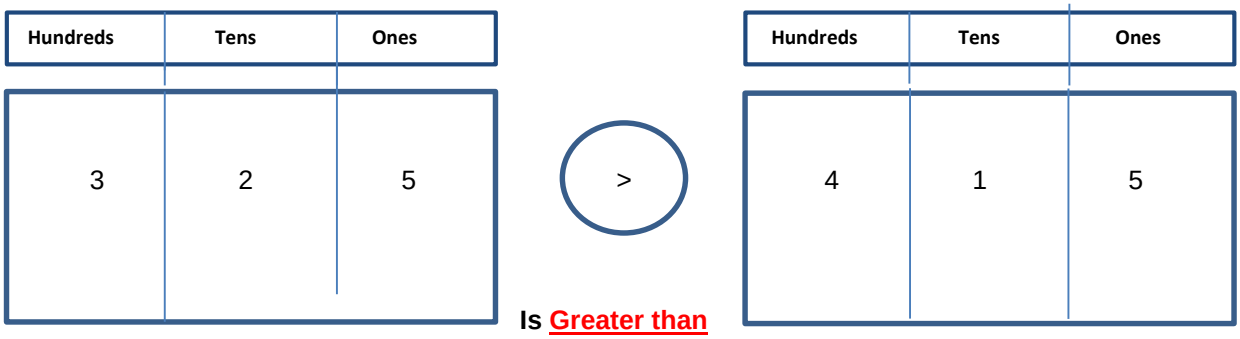
- Why is it important to place the highest dice number in the hundreds place?
- How can you prove that the numbers are in the hundreds?
- Explain how you know your number is the greatest/least?

Elaborate (Discuss Task and Related Mathematical Concepts)
Students will play a dice game with a buddy at their table. Ask for groups to share. Teacher will write the responses down and ask questions about the values of the hundreds, tens and ones.

Checking for Understanding

Purpose: Pose the following question as an exit slip to gather information about students' understanding of comparing 2 numbers using place value.

Jack solved the following problem: 325 > 415. Was his answer correct? Why or why not?



Explain your thinking:

Common Misunderstanding

Purpose: Teacher will observe the student work on their student white boards.

Students were asked to write the number 612. The teacher asked the student to underline the hundreds place value with red crayon and model the digits with base ten blocks, the tens place value with blue crayon and model the digits with base ten blocks and then the ones place value place with green crayon and model with base ten blocks.

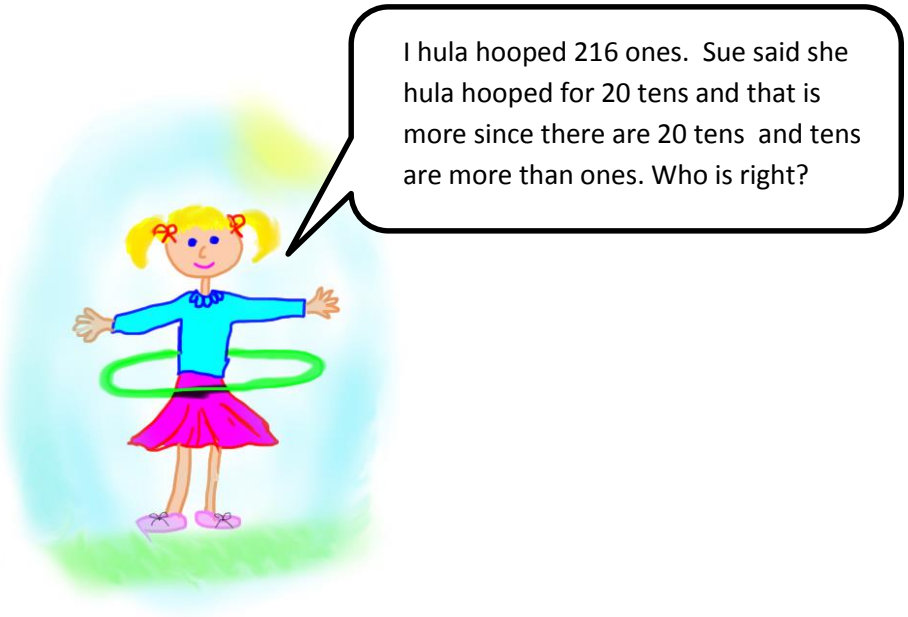
The teacher then asked the students to write an equation for 612. Possible answers are:

- 60 tens plus 12 ones
- 6 hundreds plus 12 ones
- 61 tens plus 2 ones

- Students may not understand that 100's could be represented with tens or ones or that tens could be represented by ones
- Students may underline the wrong number for hundreds, tens or ones
- Students may not understand the value of each digit is represented by the digit's position within a multi digit number
- Students may only compare part of the number

Checking for Understanding

Purpose: Pose the following example: Mary and Sue are having a Hula Hoop contest. Mary has a question.



- **In a hundred-ten-one chart show how many times Mary hula hooped.**
- **In a hundred-ten-one chart show how many times Sue hula hooped.**
- **How much is 20 tens?**
- **How many tens are in 216?**
- **Explain who hula hooped more times and why.**

Closure

Purpose: Provide students with an opportunity to monitor and reflect their understanding of place value.

Use the symbols <,>, = to make the statement true. Explain your thinking.

4 hundreds + 6 tens + 5 ones ◯ 40 tens + 6 tens + 5 ones

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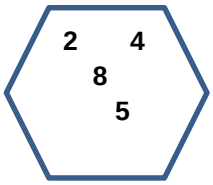
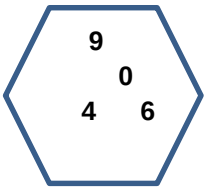
Extension Task

Purpose: Students will choose three numbers from the shape to make the sentence true.





_____ is greater than 142.

_____ is less than 494.

_____

Explain your thinking.

Research and review of standard	
Content *Standard(s):*	**Standard(s) for Mathematical**
Understand place value **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 the comparisons.	**MP2. Reason abstractly and quantitatively** **MP4. Model with mathematics**

Smarter Balanced Claim	*Smarter Balanced Item*
None	***None***

CPR Pre-Requisites *(Conceptual Understanding, Procedural Skills, and Representations)*	Conceptual Understanding and Knowledge: • Understanding that three digits of a three digit number represent amounts of hundreds, tens and ones. • Compare two and three-digit numbers based on meanings of the hundreds, tens, and ones digits, using <,=,> symbols to record the results of comparisons. Procedural Skills: • The students should know the value of each place value as: 1's,10's and 100's • Identify the place and value of each digit in a number. • Arrange numbers from least to greatest or greatest to least. • Use pictorial representation or pictures to show the value. Representational: • Use base ten blocks and drawings to show the value of units, rods and flats. • Knowing what the signs <, =, > mean. • Use 3 different numbers to create different 3 digit numbers. **Social knowledge:** What terms, definitions, and conventions must students have knowledge of in order to achieve mastery of the standard • Less than, more than, equal, 1's, 10's and 100's. • Know that a single unit represents 1, a rod represents 10 units and a flat represents 100 units

Standards Progression *		
Grade(s) below	**Target grade**	**Grade(s) above**
1.NBT.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.	**2. NBT. 1** Understand that the three digits of a three-digit number represent amounts hundreds, tens, and ones; 706 equals7 hundreds, 0 tens, and 6 ones. Understand the following s special cases: a. 100 can be thought of as a bundle of 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.2** Count within 1000; skip count by 5s, 10s, and 100s. **2.NBT.3** Read and write numbers to 1000 using base ten numerals, number names, and expanded form.	

Common Misconceptions/Roadblocks

What characteristics of this problem may confuse students?

- The fact that the students must know to look at the hundreds place first when comparing 2 three digit numbers.

What are the common misconceptions and undeveloped understandings students often have about the content addressed by this item and the standard it addresses?

- Students may look at the ones place first.
- Students may need concrete models of the numbers.
- Students may have difficulty thinking about a three digit number as hundreds, tens and ones.
- Students do not know what the symbols <, >, or = represent.
- Students have difficulty finding the difference between two numbers.

What overgeneralizations may students make from previous learning leading them to make false connections or conclusions?

- Students try to look at all three digits when comparing numbers.
- Students assume the greatest number is in the ones place.
- Students do not know what the symbols, <, > or = represent.

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Student Checkpoint

Compare the numbers below.

Write <, > or = on the line to complete the sentence.

379 ____ 419 **949 ____ 941** **622 ____622**

Below, circle **True** if the number statement is true or **False** if the number statement is false.

334 > 357 **True** **False**

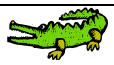
Explain your thinking in the box below.

Compare the numbers below:

314 413

Circle the number that is greater. Explain below how you know that this number is greater than the other number. You can use words or pictures to help you.

Roll your dice and put them in order to create the greatest number. For example, if you roll a 2, 1, and 6 you would write 621 not 126 or 216.

Player 1	 **<, >, =** **Greater than or less than** **Remember: The alligator eats the biggest number.**	**Player 2**

Look at your last round. Circle the greater number. Be sure to explain why.

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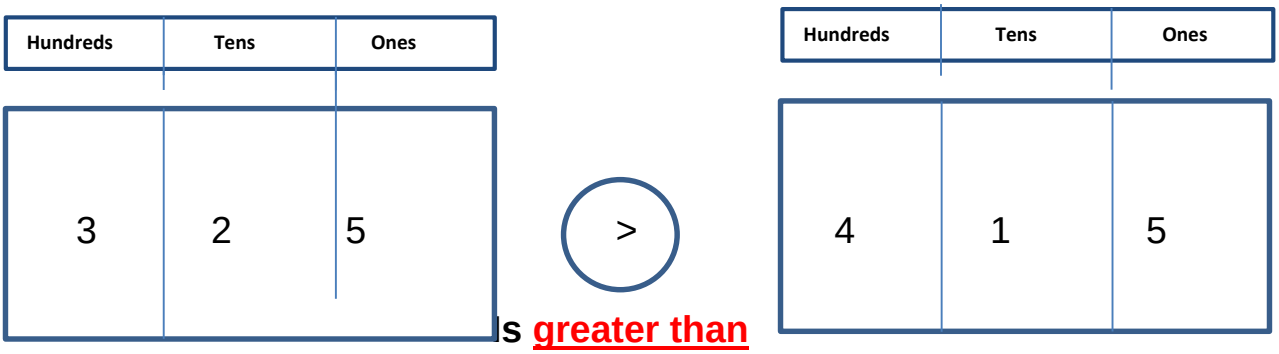
EXIT SLIP

Jack solved the following problem: **325 > 415.** Was his answer correct? Why or why not?

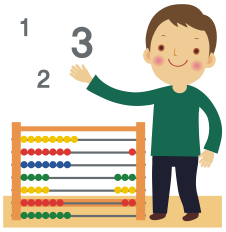


is greater than

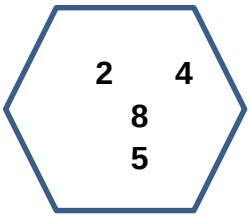
Explain your thinking:

Extension Activity:

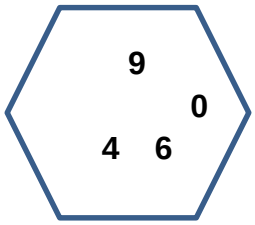
Number Choice



Look at the numbers in the shapes.
Use two of the numbers.
Write a three-digit number that will make the sentence true.



_____ is greater than 142.



_____ is less than 494.

Explain your thinking.