National Center on
INTENSIVE INTERVENTION
at American Institutes for Research ■

Place-Value Concepts

Contents

Teaching Place-Value Concepts:
Considerations for Instruction

Purpose and Overview of Guide

The purpose of this guide is to provide strategies and materials for developing and implementing lessons for students who need intensive instruction in place value. Special education teachers, mathematics interventionists, and others working with students struggling with place-value concepts may find this guide helpful.

Within college- and career-ready standards, place value is typically taught in grades K–5. This guide can be used when place-value concepts are introduced or with students in higher grade levels who continue to struggle with the concepts. Sample activities, worksheets and supplemental materials also accompany the guide and are available for download at http://www.intensiveintervention.org/.

The guide is divided into four sections:

1. Sequence of skills as defined by the college- and career-ready standards
2. A list of important vocabulary and symbols
3. A brief explanation of the difficulties students may have with place value
4. Suggested strategies for teaching place-value concepts

Sequence of Skills – College- and Career-Ready Standards

(Numbers in parentheses represents the grade level of the standard.)

EXTEND THE COUNTING SEQUENCE.

- Count to 120, starting at any number. (1)
- Read and write numerals. (1)
- Count within 1,000. (2)
- Skip-count by 5s, 10s, and 100s. (2)

UNDERSTAND PLACE VALUE.

- Compose and decompose numbers from 11 to 19 into tens and ones. (K)
- Understand a two-digit number as represented by amounts of tens and ones. (1)
- Understand 10 can be thought of as a bundle of 10 ones—called a "ten." (1)

- Understand a three-digit number as represented by amounts of hundreds, tens, and ones. (2)

- Read and write numbers to 1,000. (2)

- Compare two three-digit numbers. (2)

- Round whole numbers to the nearest 10 or 100. (3)

- Recognize that in a multidigit whole number, a digit in one place represents 10 times what it represents in the place to its right. (4)

- Read and write multidigit whole numbers. (4)

- Compare two multidigit numbers. (4)

- Round multidigit whole numbers to any place. (4)

- Recognize that in a multidigit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. (5)

- Explain patterns in the number of zeros of the product when multiplying a number by powers of 10. (5)

- Explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. (5)

- Use whole-number exponents to denote powers of 10. (5)

- Read, write, and compare decimals to thousandths. (5)

- Compare two decimals to thousandths. (5)

- Round decimals to any place. (5)

Vocabulary and Symbols

The following terms are important for students to understand when working with place value.

Digit: A symbol used to show a number	Value: Quantity of a digit	Place: The position of a digit relative to the decimal
0, 1, 2, 3, 4, 5, 6, 7, 8, 9	2 = 2 ones 39 = 3 tens and 9 ones	Ones, tens, hundreds, etc.
Place Value: The quantity represented by the position of a digit relative to the decimal	Standard notation: Writing a number with one digit in each place value	Expanded notation: Writing a number and showing the place value of each digit
42,103. 2 is in the thousands place, so its place value is 2000.	42,103	40,000 + 2,000 + 100 + 3

Word form: Writing a number using words Forty-two thousand, one-hundred three.	Decimal: A number written on the basis of powers of ten 53.109	Decimal point: A dot noting the change from positive powers of ten (left of point) to negative powers of ten (right of point) 53.109
Zero: A digit representing the absence of quantity. Zero is necessary in holding place value. 402,005	Estimate: An approximate value	Round: Substitute an approximate value (usually to the nearest 10, 100, 1,000, etc.)
Regroup: Exchange equal amounts of tens and ones, hundreds and tens, thousands and hundreds, etc. 10 ones = 1 ten	Trade/exchange/borrow/carry/rename: Alternative terms for regrouping	
1,000 = 10 hundreds		

Common Areas of Difficulty

Prerequisite skills not mastered:

- Knowledge or understanding of numbers

Specific Place-Value skills:

- *Zero (0)*
  For example, 602 is not the same as 62

- *Reading numbers*
  For example, two thousand, seventy-nine. NOT two thousand and seventy and nine.

- *Understanding place value*
  For example, in the number 312, the 1 represents 1 ten, not 1 one.

Developing Conceptual Understanding

Base-10 blocks can be used to help students understand the concepts behind place value. Base-10 blocks also can be used to explain decimals. Other place-value manipulatives are Unifix cubes, snap cubes, plastic clips, and bean sticks/beans.

Activities and Strategies Related to Specific Standards

Count to 120, starting at any number. (1)

Count within 1,000. (2)

- Practice with counting objects, on number lines, or on hundreds charts.
- Count the number of school days.

Hundreds Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	10
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

Skip-count by 5s, 10s, and 100s. (2)

- Practice with counting sets of objects, on number lines, or on hundreds charts.
- Sing counting songs. (Many examples are provided on YouTube.)

Read and write numerals. (1)

Read and write numbers to 1,000. (2)

Read and write multidigit whole numbers. (4)

- Practice handwriting for writing numerals.
  - Check for appropriate pencil grip.
  - Use poems to remember how to write numerals.
  - Explicitly teach students how to write numbers, and practice correct procedure.
- Write an orally presented number.
  - Present numbers of increasing difficulty.
- Break 23 into tens and ones.
  - 23 = 2 tens, 3 ones
- Represent 2 tens and 3 ones as a number.
  - 2 tens, 3 ones = 23
 - How many tens in 23?
  - How many ones in 23?

- Explain what each digit represents.
  - 972 = 9 hundreds, 7 tens, and 2 ones.

Compose and decompose numbers from 11 to 19 into tens and ones. (K)

Understand a two-digit number as represented by amounts of tens and ones. (1)

Understand 10 can be thought of as a bundle of 10 ones—called a "ten." (1)

- Show 17 in base-10 units. How many sets of ten? How many remaining ones?
- Line up 10 base-10 units and show equivalency to one rod.
- Line up one base-10 rod and show equivalency to 10 units.
- Represent 45 with base-10 blocks. How many sets of ten? How many remaining ones?
- Use hands to show 45. Flash four bundles of 10 ("10, 20, 30, 40"). Hold up one finger for each one ("41, 42, 43, 44, 45").
- Draw circles around sets of 10 presented on paper.
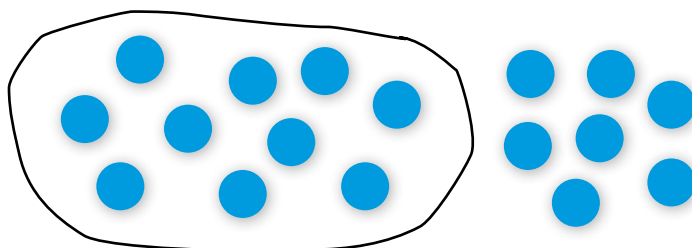
Understand a three-digit number as represented by amounts of hundreds, tens, and ones. (2)

- Line up 10 base-10 rods and show equivalency to 1 flat.
- Line up one base-10 flat and show equivalency to 10 rods. Show equivalency to 100 ones.
- Represent 124 with base-10 blocks. How many sets of hundred? How many sets of ten? How many remaining ones?
- Draw a three-digit number with squares, lines, and little squares.
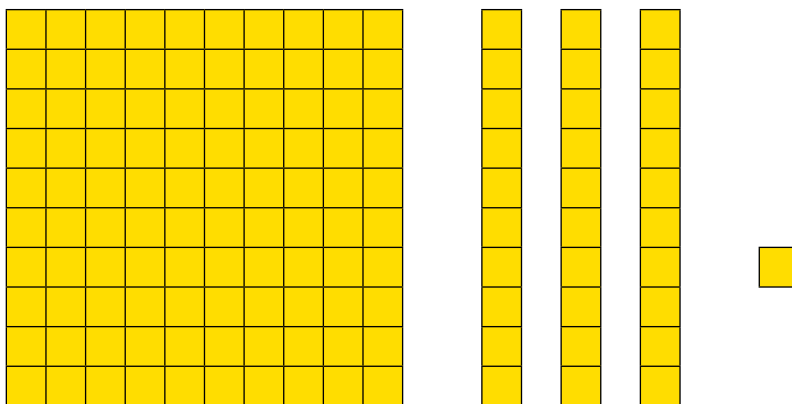
Compare two three-digit numbers. (2)

Compare two multidigit numbers. (4)

Read, write, and compare decimals to thousandths. (5)

- Teach < and > signs with a Greater Gator.

- Teach = sign with an understanding of making two sides of an equation the same.
- Use base-10 blocks to show two numbers. Compare.
    - Which amount is greater?
    - Which amount is smaller?
    - Are the amounts the same?
- Show two numbers in standard form.
- Show two numbers in expanded form.
- Show two numbers in word form.
    - Which amount is greater?
    - Which amount is less?
    - Which amount is bigger?
    - Which amount is smaller?
    - Are the amounts the same?

Recognize that in a multidigit whole number, a digit in one place represents 10 times what it represents in the place to its right. (4)

Recognize that in a multidigit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. (5)

Explain patterns in the number of zeros of the product when multiplying a number by powers of 10. (5)

Explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. (5)

Use whole-number exponents to denote powers of 10. (5)

- Discuss 1 cube = 10 flats = 100 rods = 1,000 units.
- For decimals, discuss 1 flat = 10 rods (tenths) = 100 units (hundredths)
- Explain decimal point.
    - Discuss implicitness of decimal point for all whole numbers.
- 425 has a decimal point after the 5, but we don't write it that way. We write the decimal point only if there are numbers to the right of the decimal point.
- Read the decimal point as "and." 425.38 reads as "four-hundred twenty-five and thirty-eight hundredths."
- Show the following pattern:
    - 1 x 10 = 10
    - 10 x 10 = 100
    - 100 x 10 = 1,000
    - 1,000 x 10 = 10,000
    - 10,000 x 10 = 100,000
    - 0.1 x 10 = 1
    - 0.01 x 10 = 0.1
    - 0.001 x 10 = 0.01
- Explain exponents.
    - $10^0 = 1$
    - $10^1 = 10$
    - $10^2 = 100$
    - $10^3 = 1,000$
    - $10^4 = 10,000$
    - $10^{-1} = 0.1$
    - $10^{-2} = 0.01$
    - $10^{-3} = 0.001$

Round whole numbers to the nearest 10 or 100. (3)

Round multidigit whole numbers to any place. (4)

Round decimals to any place. (5)

- Teach students to underline the place value of desired rounding. If the digit to the right of underlined digit is 0–4, round down. If 5–9, round up.
- Round to the nearest ten thousand. 5<u>4</u>6,388. 5<u>5</u>0,000.

2. Place-Value Concepts: Understanding Place Value: Representing Tens and Ones

Sample Activities

a. Representing Tens and Ones

Worksheets

a. Worksheet: Understanding Place Value: Representing Tens and Ones

b. Worksheet: Understanding Place Value: Representing Tens and Ones—Scaffolded

Understanding Place Value:
Representing Tens and Ones

College- and Career-Ready Standards Addressed:

K.NBT.1: Compose and decompose numbers from 11 to 19 into 10 ones and some further ones.

- Record each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8).
- Understand that these numbers are composed of 10 ones and one, two, three, four, five, six, seven, eight, or nine ones.

1.NBT.2: Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:

- 10 can be thought of as a bundle of 10 ones—called a ten.
- The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.
- The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).

Activity One: Representing Tens and Ones

Purpose: To represent one- and two-digit numbers using concrete manipulatives.

Principles of Intensive Intervention Illustrated:

- Provide concrete learning opportunities (including use of manipulatives).
- Provide explicit error correction, and have students repeat the correct process.
- Use precise, simple language to teach key concepts or procedures.
- Use explicit instruction and modeling with repetition to teach a concept or demonstrate steps in a process.
- Provide repeated opportunities to practice each step correctly.

Materials:

- Bears (or other manipulative to use for counting)
- Cups
- Paper and pencil or dry-erase board
- Number line (see Supplemental Materials)
- Worksheet: Understanding Place Value: Representing Tens and Ones (for extra practice)
- Worksheet: Understanding Place Value: Representing Tens and Ones—Scaffolded (for extra practice)

Modeling:

1. Write a two-digit number (e.g., 14). Show the two-digit number with bears. Say, "This is the number 14. Let's count out 14 bears."

2. Introduce grouping into sets of 10. Count to 10 while holding up your fingers. Say, "In math, we group objects and numbers into sets of 10. Count to 10 with me: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. How many fingers am I holding up? 10. That's right. I have a set of 10 on my fingers. Can you show me a set of 10 with your fingers?"

3. Group bears into sets of 10. Each set of 10 goes into a cup. Say, "Let's see how many sets of 10 are in the number 14. Let's count out 10 bears and place them in this cup. Ready? 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. 10 bears go in a cup."

4. [Try to] Make another set of 10. Say, "Each set of 10 goes into a cup."

5. Discuss the inability to make any more sets of 10. Say, "We don't have enough bears to make another set of 10, so we're finished making sets of 10."

6. Discuss how the sets of 10 and remaining ones are noted in the written numeral. Say, "How many sets of 10 did we make?" One. Say, "So, with 14 bears we have one set of 10. I see the one set of 10 written here in the number 14." Underline the 1 in 14. Say, "How many remaining ones do we have?" Four. Say, "So, with 14 bears we have four remaining ones. I see the four remaining ones written here in the number 14." Underline the 4 in 14.

7. State that in a two-digit number, the left place is the tens and the right place is the ones. Write the words "tens" and "ones" below 14.

8. Repeat with two more examples (e.g., 23, 35).

Guided Practice:

1. Write a two-digit number (e.g., 27). Have the student show the number with bears.

2. Have the student count out the sets of 10. The student places each set of 10 in a different cup.

3. The student counts the sets of 10 and writes the number of tens.

4. The student counts the remaining ones and writes the number of ones.

5. The student states number of tens and ones in the original number (e.g., "27 is two sets of 10 and seven ones").

6. Repeat with two more examples (e.g., 42, 12).

7. Provide corrective feedback as necessary.

Corrective Feedback:

Example 1

Student response: "27 has one ten."

Teacher feedback: 27 has 1 set of 10. That's not quite right. Let's check our work. Count with me: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Put that set of 10 in a cup. 27 has another set of 10. Count with me: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Put that set of 10 in a cup. Can I make another set of 10? Let me see: 1, 2, 3, 4, 5, 6, 7. No. I can't make another set of 10. Only sets of 10 can go in a cup, so I leave these seven bears outside the cups. So, 27 has 1, 2 cups. That's two sets of 10. 27 has seven remaining ones. 27 has two tens and seven ones. How many tens and ones does 27 have?

Example 2

Student response: "27 has three tens."

Teacher feedback: That's not quite right. Let's check our work. Remember, each cup must have 10 bears. We are making sets of 10. 27 has one set of 10. Count with me: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Put that set of 10 in a cup. 27 has another set of 10. Count with me: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Put that set of 10 in a cup. Can I make another set of 10? I have 1, 2, 3, 4, 5, 6, 7 remaining bears. Can seven bears go in a cup? No. Each cup must have a set of 10 bears. 27 has 1, 2 cups. That's two sets of 10. 27 has seven remaining ones. 27 has two tens and seven ones. How many tens and ones does 27 have?

Example 3

Student response: Miscounts of ten.

Teacher feedback: That's not quite right. Let's check our work. Let's practice counting to 10. Let's put 10 bears in a row and count them. Let's touch each bear as we give the bear a count. Ready? 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Now, let's count to 10 using a number line. Let's touch each number as we count. Ready? 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Now, count to 10 using our fingers. Hold up one finger for each number you count. Ready? 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Now let's count to 10 three times. Ready?

Worksheet

Understanding Place Value: Representing Tens and Ones

Objective: Represent one- and two-digit numbers using manipulatives and tell how many tens and ones are in a two-digit number.

Directions: For each number, have students draw (with tallies, stars, circles) or use manipulatives. Draw a circle around each group of ten, or otherwise mark to show a group of ten. Then write how many tens and ones are in the number.

Number	Count	Tens	Ones
Example 13		1	3
18			

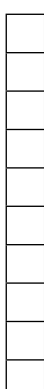| Number	Count	Tens	Ones
11			
22			
17			

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Worksheet

Understanding Place Value: Representing Tens and Ones—Scaffolded
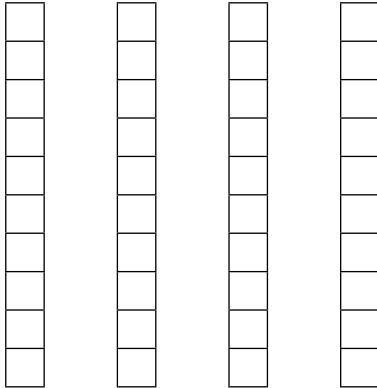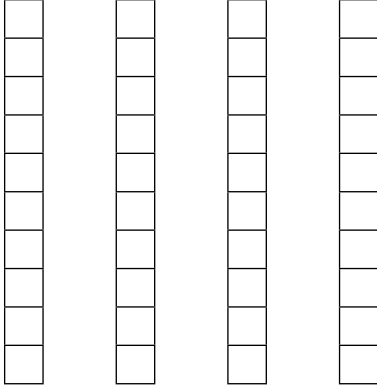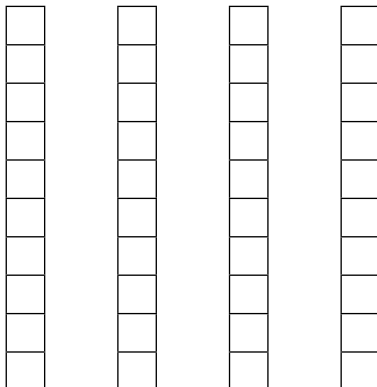
Objective: Represent one- and two-digit numbers using representations and tell how many tens and ones are in a two-digit number.

Directions: For each number, have students tally or shade in squares that represent ones in the box provided, while counting. The squares are organized in groups of tens. Use the representations to determine how many tens and ones are in the number.

Number	Count				Tens	Ones
Example **13**					**1**	**3**
18						

Number	Count	Tens	Ones
22			
17			
26			

Number	Count	Tens	Ones
35			
27			
31			

3. Place-Value Concepts: Understanding Place Value: Using Base-10 Blocks

Sample Activities

a. Using Base-10 Blocks

Worksheets

a. Worksheet: Understanding Place Value: Using Base-10 Blocks

b. Worksheet: Understanding Place Value: Using Base-10 Blocks —Scaffolded

Understanding Place Value:
Using Base-10 Blocks

College- and Career-Ready Standard Addressed:

2.NBT.1 Understand that the three digits of a three-digit number represent hundreds, tens, and ones. Understand the following as special cases:

- 100 can be thought of as a bundle of tens, or 10 tens, which is called a hundred.
- The numbers 100, 200, 300, 400, 500, 600, 700, 800, and 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (with 0 tens and 0 ones).

Activity One: Using Base-10 Blocks

Purpose: To represent three-digit numbers using proportional concrete manipulatives.

Principles of Intensive Intervention Illustrated:

- Provide concrete learning opportunities (including use of manipulatives).
- Provide explicit error correction, and have students repeat the correct process.
- Use precise, simple language to teach key concepts or procedures.
- Use explicit instruction and modeling with repetition to teach a concept or demonstrate steps in a process.
- Provide repeated opportunities to practice each step correctly.
- Once students can complete entire examples and explain their work, incorporate fluency-building activities.
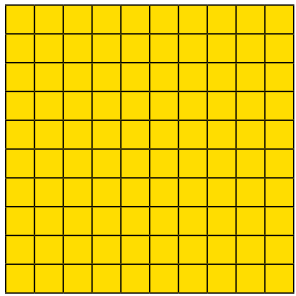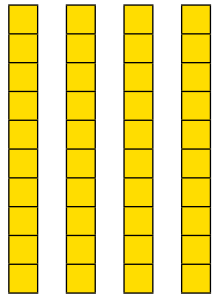
Materials:

- Base-10 blocks (see Supplemental Materials)
- Place-value mat with columns for hundreds (flats), tens (rods), and ones (units—see Supplemental Materials)
- Paper and pencil or dry-erase board
- Worksheet: Understanding Place Value: Using Base-10 Blocks (for extra practice)
- Worksheet: Understanding Place Value: Using Base-10 Blocks—Scaffolded (for extra practice)

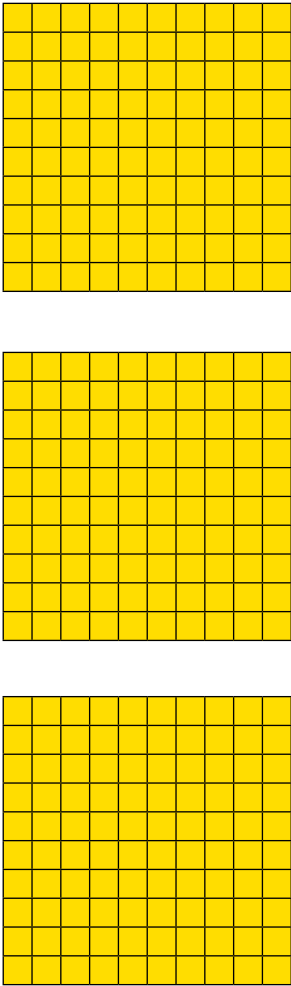| Hundreds	Tens	Ones

Modeling:

1. Review a one-digit number with the student. Write the number and place the corresponding number of units on a place-value mat. For example say, "This is the number 7. I can show the number 7 using my place-value mat. The number 7 has 7 in the ones place. We use these little blocks, called units, to show the number of ones. I count out 1, 2, …, 7 units and place them in the ones column of the mat. The number 7 does not have any tens or any hundreds, so we leave those columns empty: 7 = 7 ones."

2. Review the number 10. Write the number 10. Place 10 units in the ones column. Line them up to show 10 units = 1 rod. Exchange the 10 ones (units) for 1 ten (rod) and place in the tens column.

3. Point to the 1 in the tens place of written number (10) and the 1 rod in the tens column on the place-value mat. Emphasize that 0 in the ones place of a written number corresponds to an empty ones column on the place-value mat. If necessary, repeat with two more two-digit numbers (e.g., 35 and 70).

4. Write a three-digit number (e.g., 142). Place two units, four rods, and one flat in their corresponding columns. Explain that the two units equal the number of ones in the number 2, the four rods equal the number of tens in the number 4, and the one flat equals the number of hundreds in the number 1. Draw a connection between the numbers of objects in each column of the place-value mat the corresponding digits in the written number.

Hundreds	Tens	Ones

= 142

5. Provide two more examples (e.g., 623 and 551).

6. Explain that hundreds are special numbers because they are bundles of tens, or 10 tens (have students count out 10 tens to make 100). "The numbers 100, 200, …, 900 refer to 1, 2, …, 9 bundles of ten. They are different because they have 0 tens and 0 ones." Write a three-digit number representing a multiple of 100 (e.g., 300). Use base-10 blocks to represent the number.

Hundreds	Tens	Ones

7. State that there are 0 ones, so the ones column is empty. Because there are 0 tens, the tens column also is empty. There are 3 hundreds, and so there are three flats in the hundreds column.

8. Repeat with two more examples (e.g., 700 and 400).

Guided Practice:

1. Write a three-digit number (e.g., 352); have the student represent it with base-10 blocks on a place-value mat.

2. Have the student state the number of ones, tens, and hundreds in the number. Ensure that it corresponds with the number of blocks on the place-value mat. Repeat with two more examples (e.g., 919 and 402).

3. Write a three-digit multiple of 100 (e.g., 200); have the student represent it with base-10 blocks.

4. Have the student state the number of ones, tens, and hundreds in the number. Ensure that it corresponds with the number of blocks on the place-value mat. Repeat with two more examples (e.g., 700 and 900).

5. Provide corrective feedback as necessary.

Corrective Feedback:

Example 1

Student response: "402 = forty-two"

Teacher feedback: "This number is four hundred two. It has three digits (point and count): 402 has 4 hundreds, 0 tens, and 2 ones. This number is forty-two. It has only two digits (point and count): 42 has 4 tens and 2 ones. The 0 in 402 is a placeholder and helps us remember that there are no tens in this number. Let's use two place-value mats to show both numbers so that we can see how they are different."

Example 2

Student response: "200 has 20 tens and 0 ones. So I put 20 rods in the tens column of my place-value mat, and I leave the ones column empty."

Teacher feedback: "Remember, each column can have only up to 9. If we have 10 of something, we must exchange. Remember, 10 ones = 1 ten and 10 tens = 1 hundred. I see that you put 20 rods to show 20 tens in your tens column. If we have a group of 10 rods, we exchange them for a flat because 10 tens is 1 hundred. Let's count by 10 to see: 10, 20, …, 100. So, we take these 10 rods out and exchange them for 1 flat. Where do we put the flat? Good. It goes in the hundreds column. Do you think we have enough rods in the tens column to exchange again? Show me. Good. Let's look at the number again: 200. How many hundreds are in 200? Yes, two. That's why we have 2 flats in the hundreds column of our place-value mat. How many tens are in 200? How many ones?"

Example 3

The student's responses indicate that he or she has a conceptual understanding of basic place value but lacks fluency in recognizing the value of individual digits in multidigit numbers.
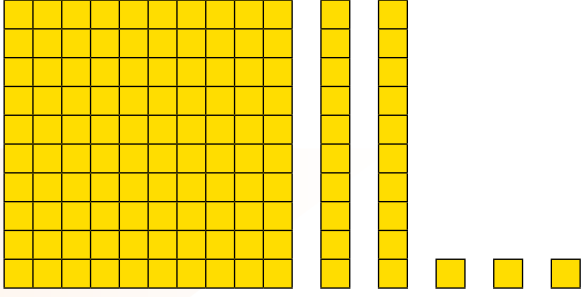
Teacher feedback: Play Meet or Beat Your Score with place-value flashcards. The flashcards should have one three-digit number printed on one side, with one of the digits bolded (e.g., 348 with 4 bolded). The student reads the number aloud (e.g., "three hundred forty-eight") and then identifies the place value associated with the bolded digit and assigns meaning to that value (e.g., "four stands for 4 tens or 40"). If the student responds correctly, place the card in a pile. If the student responds incorrectly, provide immediate corrective feedback and have him or her repeat that card; then put it in the pile. The student has one minute to answer as many flashcards as possible, and the score is noted. Then the student has one minute to try to meet or beat that score.
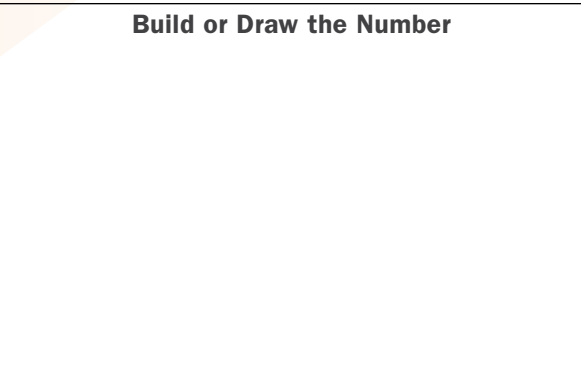
Worksheet

Understanding Place Value:
Using Base-10 Blocks

Objective: Represent three-digit numbers as flats, rods, and units and tell how many hundreds, tens, and ones are in a three-digit number. Count flats, rods, and units to determine what three-digit number is being displayed.

Directions: Use flats (hundreds), rods (tens), and units (ones) to build the number or draw a representation in the box. Write how many hundreds, tens, and ones are in each number.

Example:	Build or Draw the Number
123	

Hundreds	Tens	Ones
1	**2**	**3**

Example:	Build or Draw the Number
219	

Hundreds	Tens	Ones

Example: **495** 	**Build or Draw the Number**
Hundreds Tens Ones	

Example: **572** 	**Build or Draw the Number**
Hundreds Tens Ones	

Example: **314** 	**Build or Draw the Number**
Hundreds Tens Ones	

Example:	Build or Draw the Number
231	
Hundreds | Tens | Ones	
| |	
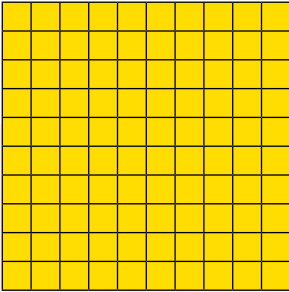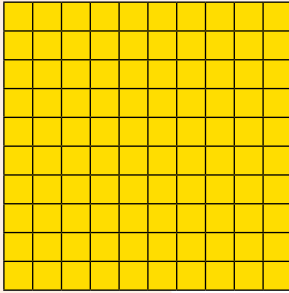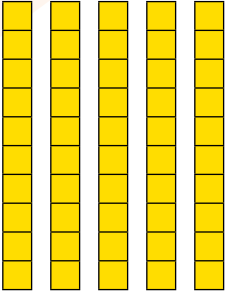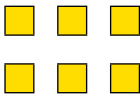
Example:	Build or Draw the Number
105	
Hundreds | Tens | Ones	
| |	
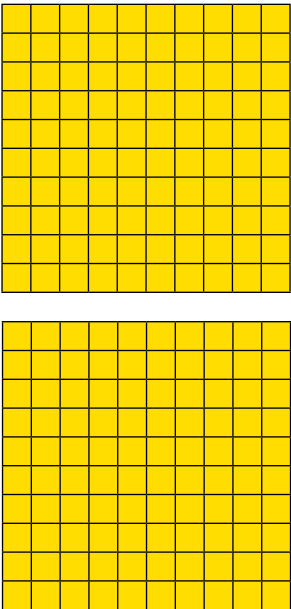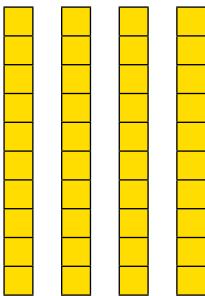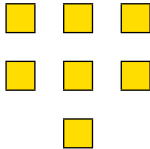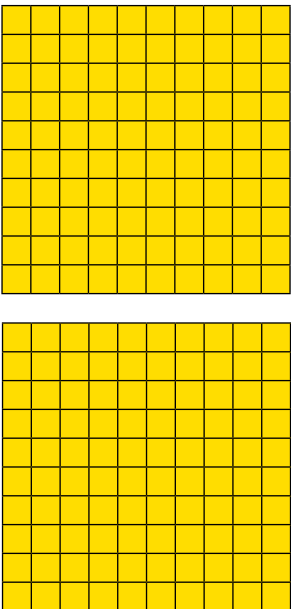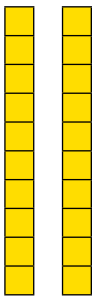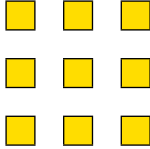
Worksheet

Understanding Place Value:
Using Base-10 Blocks—Scaffolded
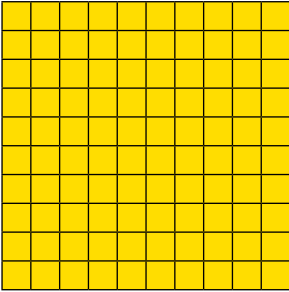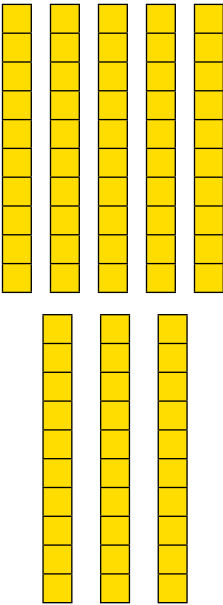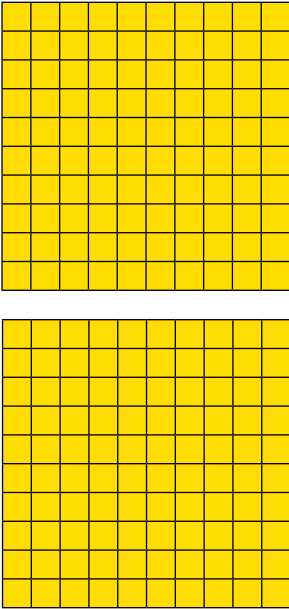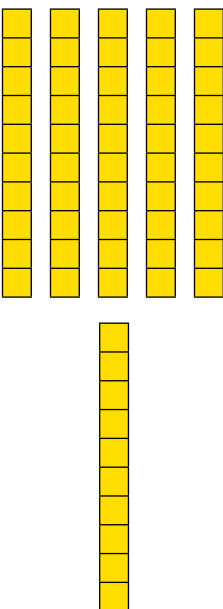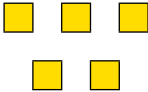
Objective: Represent three-digit numbers as flats, rods, and units and tell how many hundreds, tens, and ones are in a three-digit number. Count flats, rods, and units to determine what three-digit number is being displayed.

Directions: Count and write the number of hundreds, tens, and ones. Then write the number that is represented by the blocks.

Hundreds	Tens	Ones	Number
__1__	__1__	__1__	**111**
_____	_____	_____	

Hundreds	Tens	Ones	Number
_____	_____	_____	
_____	_____	_____	

Hundreds	Tens	Ones	Number
_____	_____	_____	
_____	_____	_____	

4. Place-Value Concepts: Understanding Place Value: Comparing Two-Digit Numbers

Sample Activities

a. Comparing Two-Digit Numbers

Worksheets

a. Worksheet: Understanding Place Value: Comparing Two-Digit Numbers

Understanding Place Value: Comparing Two-Digit Numbers

College- and Career-Ready Standards Addressed:

1.NBT.B.2 Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:

- 10 can be thought of as a bundle of ten ones, or 10 tens, called a ten.
- The numbers 10, 20, 30, 40, 50, 60, 70, 80, and 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).

1.NBT.B.3 Compare two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with >, =, and < symbols.

Activity One: Representing Tens and Ones

Purpose: To compare 2 digit numbers with and without the use of manipulatives.

Principles of Intensive Intervention Illustrated:

- Provide concrete learning opportunities (including use of manipulatives).
- Provide explicit error correction, and have students repeat the correct process.
- Use precise, simple language to teach key concepts or procedures.
- Use explicit instruction and modeling with repetition to teach a concept or demonstrate steps in a process.
- Provide repeated opportunities to practice each step correctly.
- Once students can complete entire examples and explain their work, incorporate fluency building activities.
- Have students explain new concepts, in their own words, incorporating the important terms you've taught.
- Break tasks into smaller steps, compared to less intensive levels of instruction/intervention

Materials:

- Base-10 blocks (see Supplemental Materials)
- Place value mat with columns for tens (rods), and ones (units) (see Supplemental Materials)
- Paper/pencil or dry-erase board
- Flash cards with 2-digit numbers on one side (see Supplemental Materials)
- Worksheet: Understanding Place Value: Comparing Two-Digit Numbers (for extra practice)

Tens	Ones

Modeling:

1. Use the Greater Gator to review Greater than >, Less than <, Equal to =. Remind students: *The gator always wants to eat the bigger number.*

   Write one digit numbers on opposite ends of the board or display values with ones units. Tell students to make the "Greater Gator" symbols with their arms or fingers to show which number is larger. After each example say, "*Yes, ___ is greater than ___.*"

2. Engage students in a discussion. Ask, "Which is bigger, a one or a ten?" Display a 1 dollar bill and a 10 dollar bill. Say, "That's right, we would say that a ten is bigger or larger. Bigger and larger mean the same thing." Push students to explain their reasoning by using place value. Ask, "How do you know that a ten is larger than a 1?" Have students discuss this question with a partner and use base-10 blocks or a place value mat to aid their explanation.

• Note whether or not students mention place value in their reasoning. If students do not mention place value in their reasoning or appear to be stuck, display 10 and 1 vertically in a place value chart like the one below.

Tens	Ones
1	0
	1

• Display a ones unit and a tens rod. Point to the chart as you explain that a one is smaller than a ten. Ask, "How many ones does it take to make a ten? Yes, it takes ten."

3. Explain the purpose of the lesson to students. Say, "We will learn how to use place value to compare numbers. Compare means to look at two things, often side by side, and to figure out how they are different. You will be able to look at two numbers and tell which one is larger, or bigger. When you want to know which number is largest, you can use base-10 blocks or a place value chart to help."

4. Tell students that you will show them how to *compare* 2 numbers and tell which number is larger using base-10 blocks.

5. Display the numbers 65 and 47 vertically on lined or graph paper.

6. Now explain to students, "We know that the number 65 has 6 tens and 5 ones," as you write the number on a place value chart.

7. Now display the value with base-10 blocks where the students can see.

Tens = 6, ones = 5

8. Explain, "When we compare two things, we want to look at the two things right by one another. This will help us to see how they are different. Let's look at the other number."

9. Tell the students to write the number 47 on their place value mat. Ask, "How many tens?" 4. "How many ones?" 7.

10. Tell the students to show the number 47 with base-10 blocks while you model with blocks as well. Tens = 4, ones = 7

11. Tell students you want to see which number is larger. You want to start by looking at the largest blocks or the largest place value. Ask, "Which are larger, tens or ones?" The tens.
   ▪ Explain while pointing to the blocks and the place value mat, "65 has 6 tens. 47 only has 4 tens. We can see that 65 is bigger than 47 just by looking at the tens."

12. Ask, "Which number would the "Greater Gator" want to eat?" Write a symbol between the two numbers as they are displayed and say "65 is greater than 47."

65 > 47

13. Repeat with an example where the tens are the same and the ones are different, such as: 82 and 84.
   ▪ Tell students to compare the tens in these two numbers. Ask students, "Which number has more tens?"
   ▪ Explain, "The number 82 has 8 tens. The number 84 also has 8 tens. The tens are the same, or equal. When the values of the tens are the same, we need to move over to the next place value and look at the ones."

Guided Practice:

1. Display the numbers 37 and 41. Remind students that in order to tell which number is larger, we want to look at the two numbers right by one another, or *compare* them, so that we can see how they are different. Place value charts and blocks can help us do that.

2. Tell students to write each number in the place value chart. For each number, ask the students, "How many tens? How many ones?"

   - Tip: Increase opportunities for response by giving students a "signal" (e.g., a clap, tap, or snap of your fingers) to provide a choral response or using response cards with numbers.

3. Tell students, "We can look at the largest place value first to see which number is larger. Which place value is the largest? Yes, the tens."

4. Tell students, "Look at the tens. Which number has more tens? Tell your partner which number has more tens."

5. Check with students, "How many partners think 37 is larger? How many partners think 41 is larger? Let's check with base-10 blocks." Prompt students to build both numbers with blocks to check to see if they were correct.

6. Tell students to turn and talk with their partners. Partners should take turns explaining how they know which number is larger.

   - Prompts, "Which place value should we compare first? Which place value is the largest? Which number has more hundreds?"

7. Prompt students to compare the two numbers using the "Greater Gator" symbols.

8. Display $37 < 41$ for all students to see. Have students check their answers.

9. Repeat steps above using an example where the tens are the same and the ones are different such as: 93 and 96.

Scaffolding Tips:

The intensity of this activity can be altered, depending on student needs, by scaffolding the skill of comparing 2-digit numbers into 2 parts:

- Determining the larger 2-digit number by comparing 1 place value (tens)
- Determining the larger 2-digit number by comparing 2 place values (tens and ones)

These skills could be taught together, or could be broken up, across several days if needed. The following sequence details how the teaching of these skills could be broken up.

Independent Practice:

1. Students will play a game in pairs. Each pair of students will receive a deck of 2-digit number cards. Each student should take half of the deck and lay their cards face down.

2. Pairs of students will simultaneously flip one card from their piles and compare their cards. The student with the largest card gets to take both cards.

   ▪ The deck of numbered cards should include multiple colored cards which will be "Prove it!" cards. When a "Prove it!" card is flipped, students have to use a place value mat or base-10 blocks to prove which number is larger. Students will then display the number comparison so that they teacher can see their work as he or she circulates the room.

Adaptation for Struggling Students:

- Create decks containing cards with only ones place value until students build fluency.
- Before students play the game, have students underline each tens place value in the numbers on their cards or write "tens" and "ones" above the digits like in their place value charts.
- Require students to "Prove it!" for each set of cards that is flipped and record each comparison.

Adaptation to Increase Difficulty:

- Group students in threes of fours to increase the amount of numbers that students must compare.
- Create decks containing cards with 3 place values rather than 2, including challenging cards where multiple place values are the same.

Worksheet

Understanding Place Value: Comparing Two-Digit Numbers

Objective: Compare two two-digit numbers using the symbols < = >.

Directions: Write the two numbers in the tables provided and compare the two numbers using the symbols < = >.

Greater than >	Less than <	Equal to =

Example: 54 and 82

Tens	Ones
5	4
8	2

Compare: _____ 54 < 82 _____

1. 36 and 22

Tens	Ones

Compare: _____

2. 14 and 12

Tens	Ones

Compare: _____

3. 26 and 22

Tens	Ones

Compare: _____

4. 76 and 67

Tens	Ones

Compare: _____

5. 86 and 81

Tens	Ones

Compare: _____

6. 65 and 52

Tens	Ones

Compare: _____

7. 18 and 12

Tens	Ones

Compare: _____

8. 36 and 35

Tens	Ones

Compare: _____

9. 45 and 43

Tens	Ones

Compare: _____

10. 84 and 82

Tens	Ones

Compare: _____

11. 26 and 22

Tens	Ones

Compare: _____

12. 97 and 99

Tens	Ones

Compare: _____

13. 47 and 74

Tens	Ones

Compare: _____

14. 63 and 66

Tens	Ones

Compare: _____

15. 59 and 60
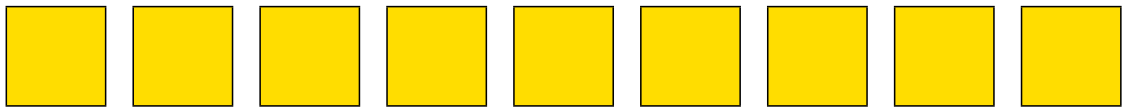
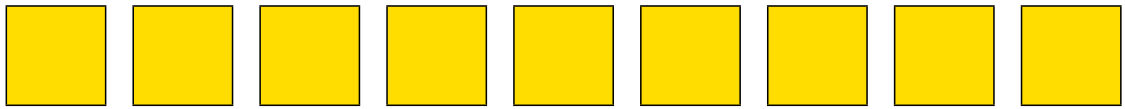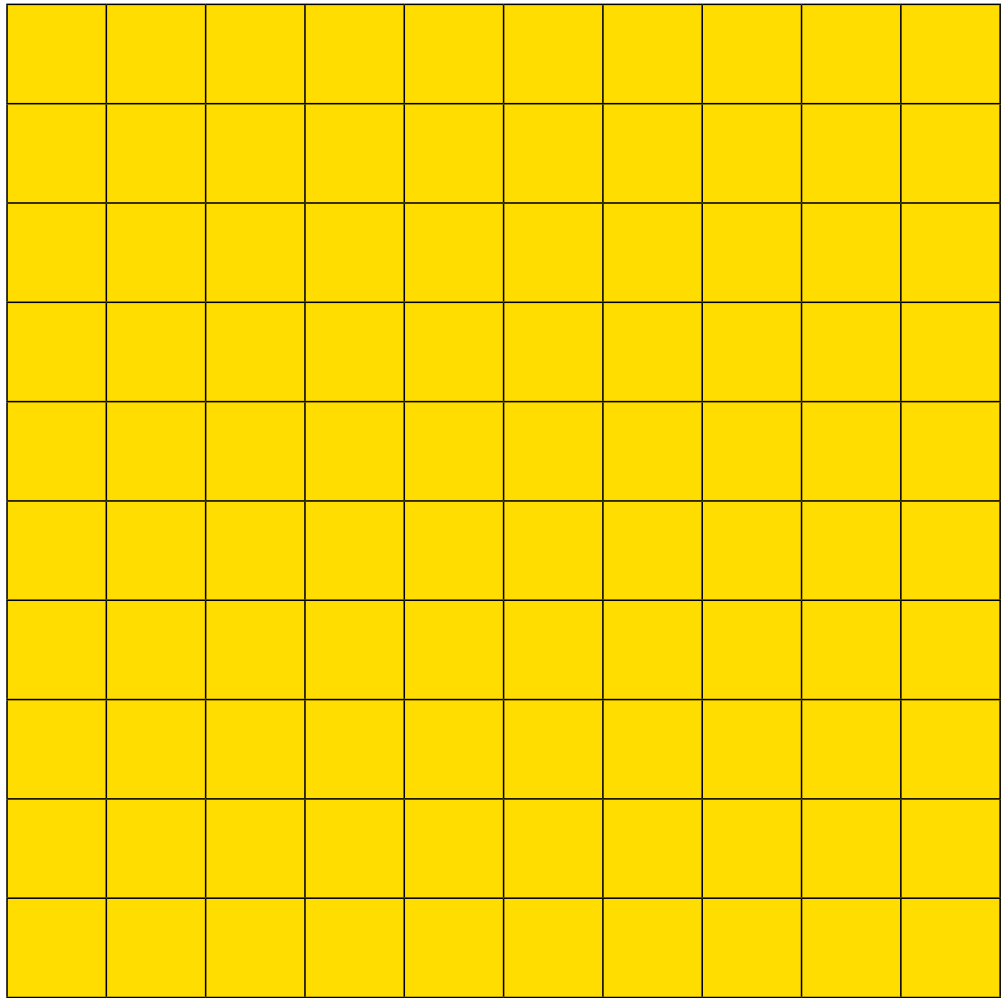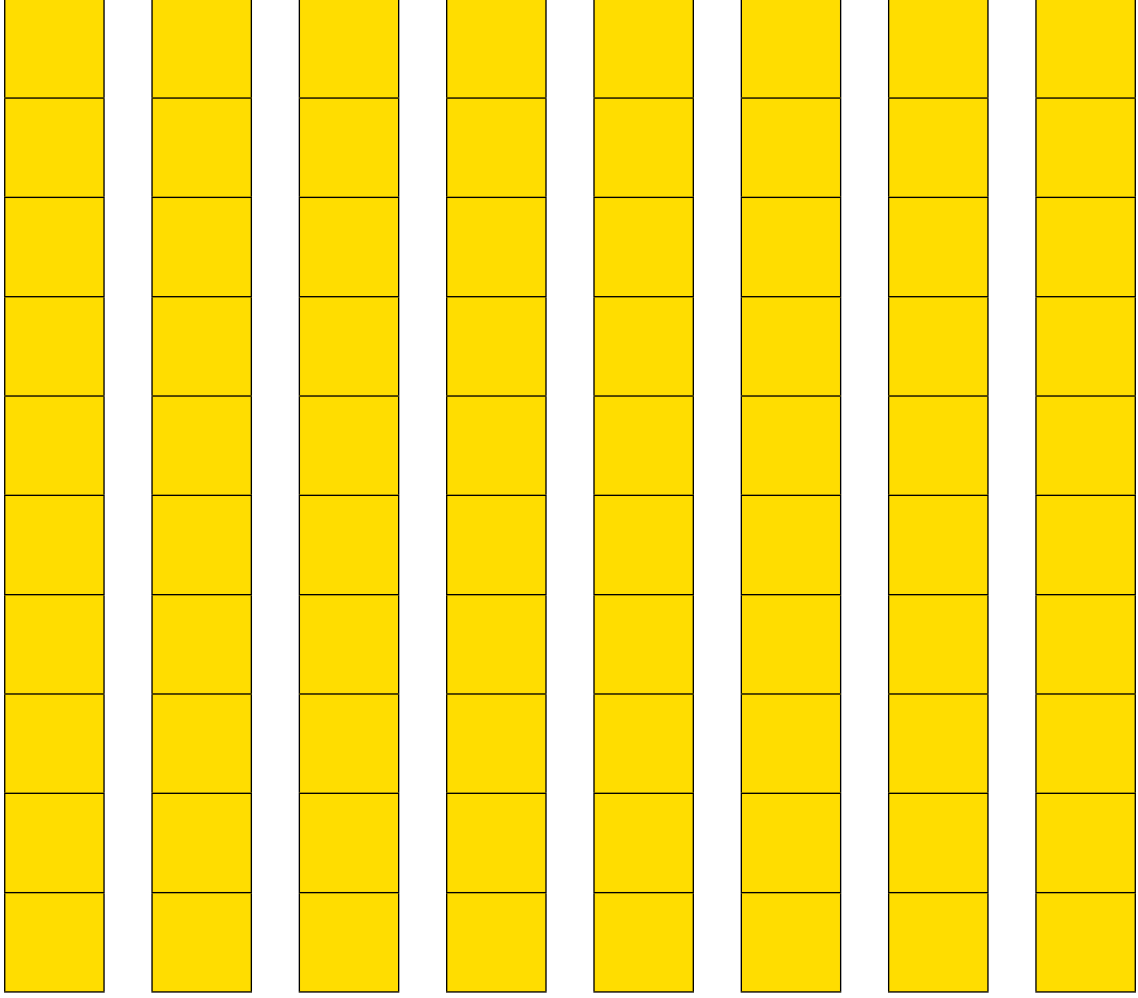| Tens	Ones

Compare: _____

5. Supplemental Materials

a. Number Line 0–10

b. Number Line 0–20

c. Base-10 Blocks

d. Place-Value Mat: Hundreds, Tens, Ones

e. Place-Value Mat: Tens, Ones

f. Two-Digit Number Flashcards

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0   1   2   3   4   5   6   7   8   9   10

A vertical number line labeled from 0 to 20.
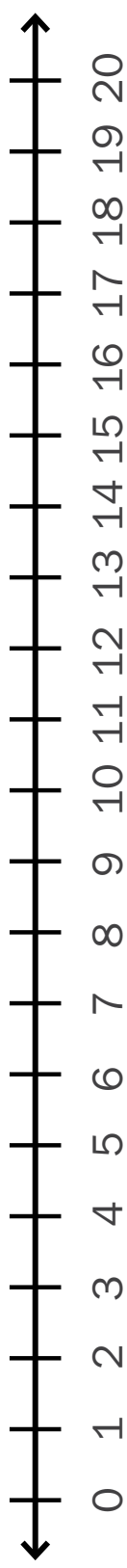
Hundreds	Tens	Ones

Tens	Ones

27	91
31	49
18	56

64	82
73	15
68	37

80	**22**
43	**54**
96	**30**

61	17
34	45
28	89

50	**2**
7	**76**
95	**52**

73	13