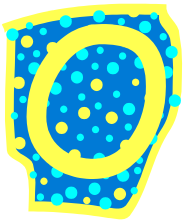


CONSTRUCTING TASK: The Importance of Zero

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

STANDARDS FOR MATHEMATICAL CONTENT

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

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

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

STANDARDS FOR MATHEMATICAL PRACTICE

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.

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

BACKGROUND KNOWLEDGE

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

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

Students should have had prior experiences and/or instruction with place value with ones and tens. This task will review and expand on this understanding by introducing larger numbers. Students should also have experience using base-ten blocks. While using base ten blocks, use the opportunity to discuss with your students the three forms in which a numeral can be displayed:

using base-ten numerals (both standard form and modeling), number names, and expanded form. Incorporate this throughout the three parts of this task.

ESSENTIAL QUESTIONS

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

MATERIALS

- 4 envelopes with flaps folded back, or library pockets, each labeled with a place value (ones, tens, hundreds, and thousands)
- 1 set of place value number cards 0 – 9 with numbers on the top of each strip
- Groupable counters such as unifix cubes or pre-grouped counters such as base ten blocks
- Set of stackable expanded notation arrow cards
- Suggested Book: *A Place for Zero* by Angeline LoPresti (optional)

GROUPING

Whole Group/small group

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I

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

1. Place a digit in the ones pocket. Have the students discuss what this number represents. (The number can be represented with base ten manipulatives as the number is discussed.)
2. Continue to add one to this digit until you reach 10. Ask: What happens if we add one to the number 9?
3. Repeat this process to discuss what happens after numbers like 19, 99, 109, 199. Etc.
4. With each situation, discuss what the "0" represents. Why is the "0" important? Also demonstrate what each digit is worth when it is placed in various pockets. Discuss that a 4 in the hundreds pocket is worth 400 while a 4 in the tens pocket is worth 40.
5. Create them with the stackable place value cards and write the expanded form of the numbers as you create them **or** discuss what happens if a "0" is used as a digit. (Ex. 207 = 200 + 7.) What is the importance of zero?

Part II
Working in groups of three, students will create the base-ten number, number names, and expanded form. Each student in the groups will be assigned a number form and record their work within their math journals or on a piece of paper.

- The student assigned "base-ten number" will create a three digit number using the 0-9 number cards. This number **must include a 0** and will be used by all three students to fulfill their number form. This student will also create a base ten model of the number.
- The student assigned "number names" will write the number name of the number created by their partner. This student will write out the number in word form. This should be written both as "three hundred fifty-seven" and "three hundreds, five tens, seven ones."
- The third student will be assigned "expanded form". This student will create the number using the arrow cards and write an expanded form addition sentence for this number.

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

FORMATIVE ASSESSMENT QUESTIONS

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

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

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

DIFFERENTIATION

Extension

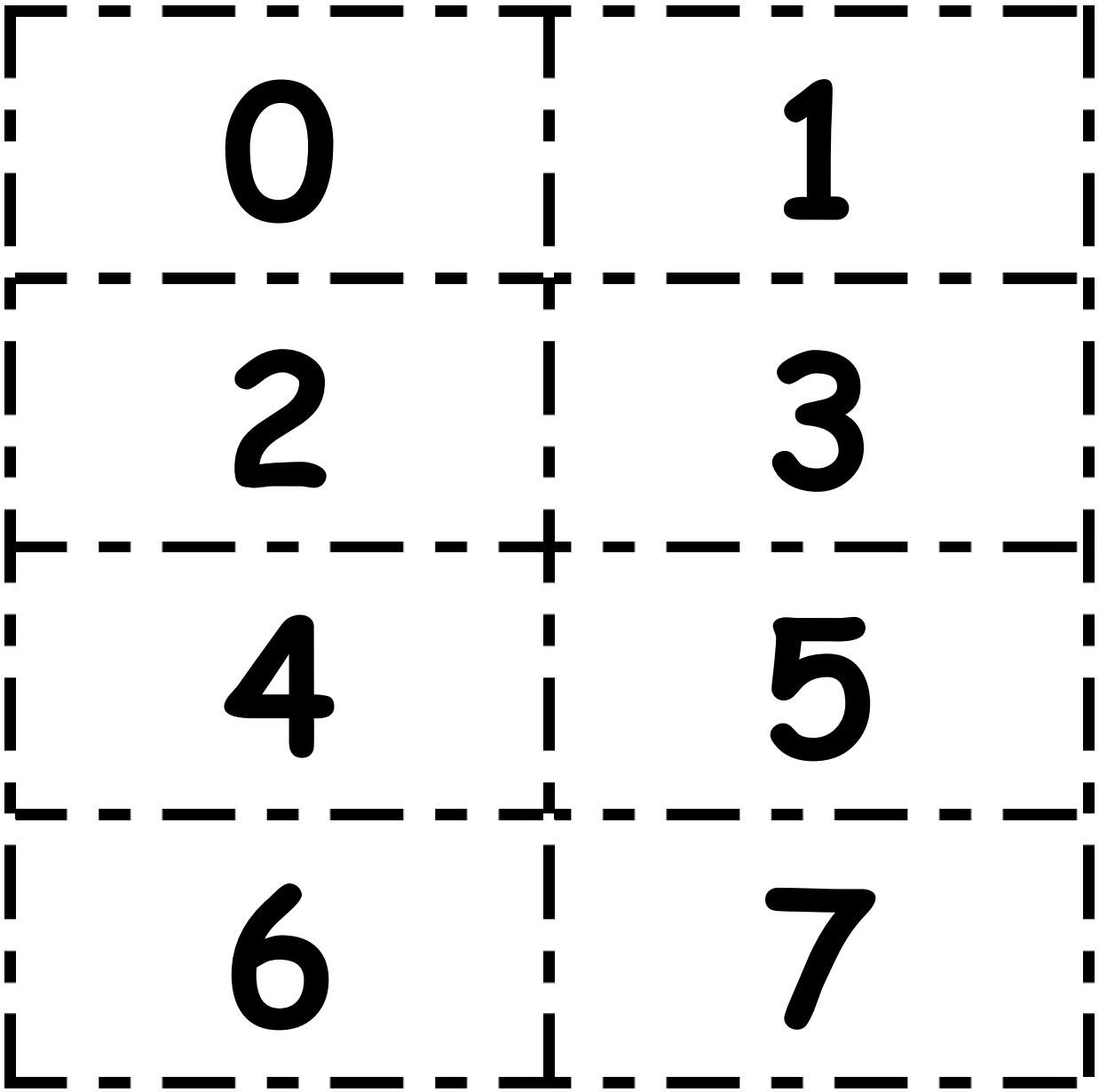
- Display models of ones, tens, and hundreds in mixed arrangements. Encourage students to say the amount shown in base-ten language (Five hundreds five ones), in standard language (Five hundred five), in written language (505), and in expanded notation (500 + 5).

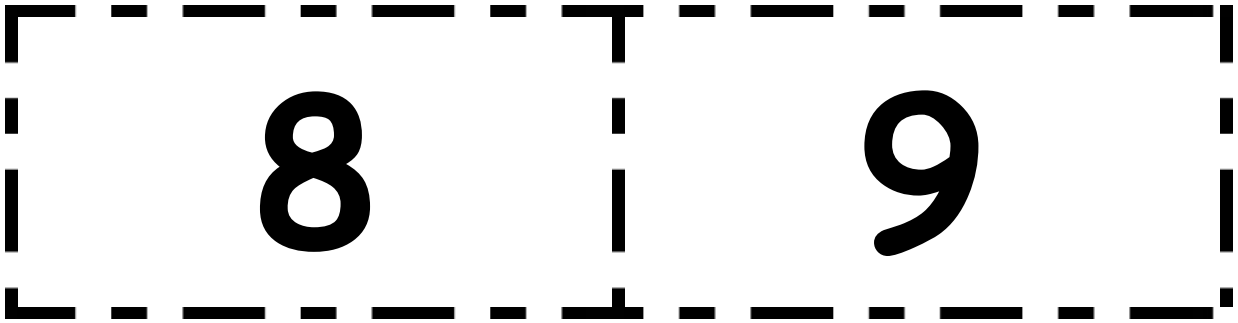
Intervention

- Say the number name for a number with either two or three digits.

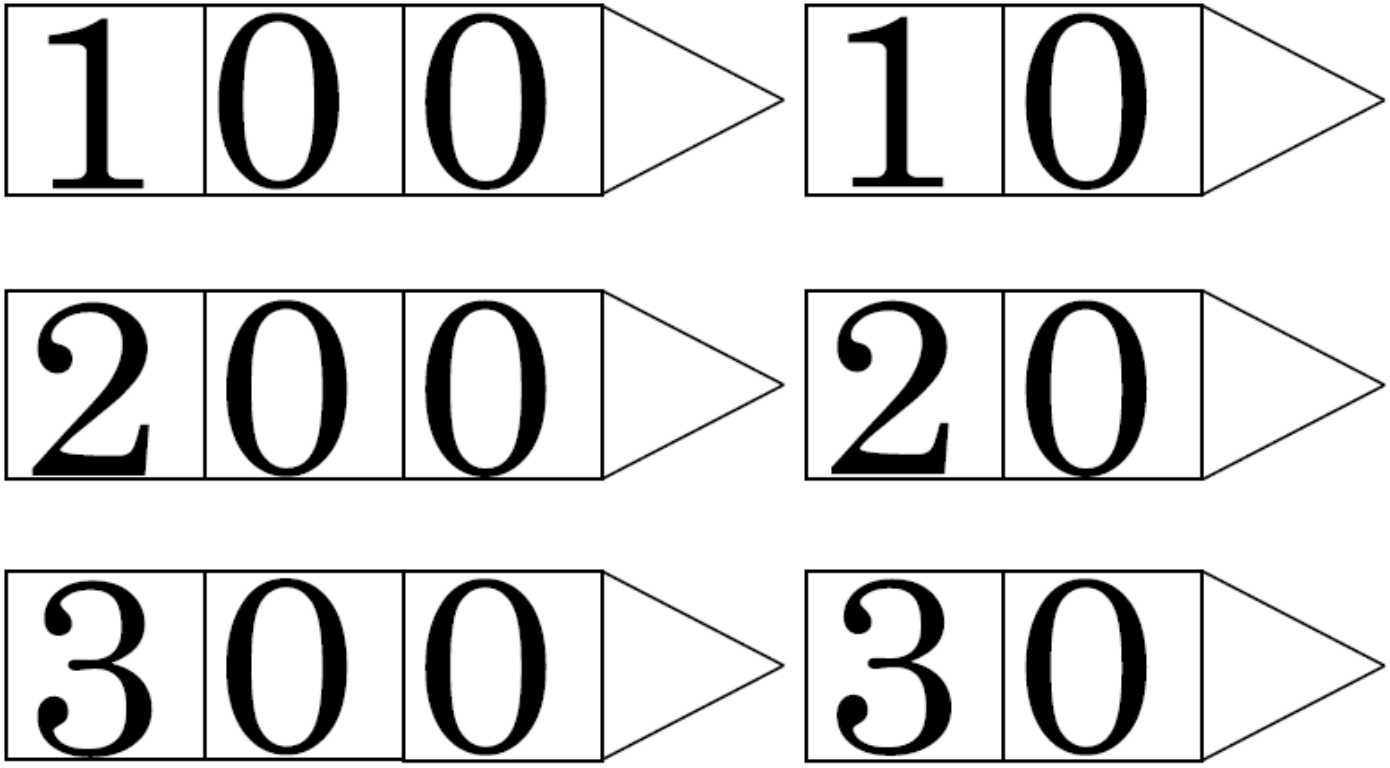
- Allow students to use their own base ten models to show that number and press it on a calculator (or write it). Pay special attention to the teens and the case of zero tens.

Place Value Number Cards





Material Master 4-14 **Arrow Cards** *Book 4, pages 13,26; Book 5, page 11*



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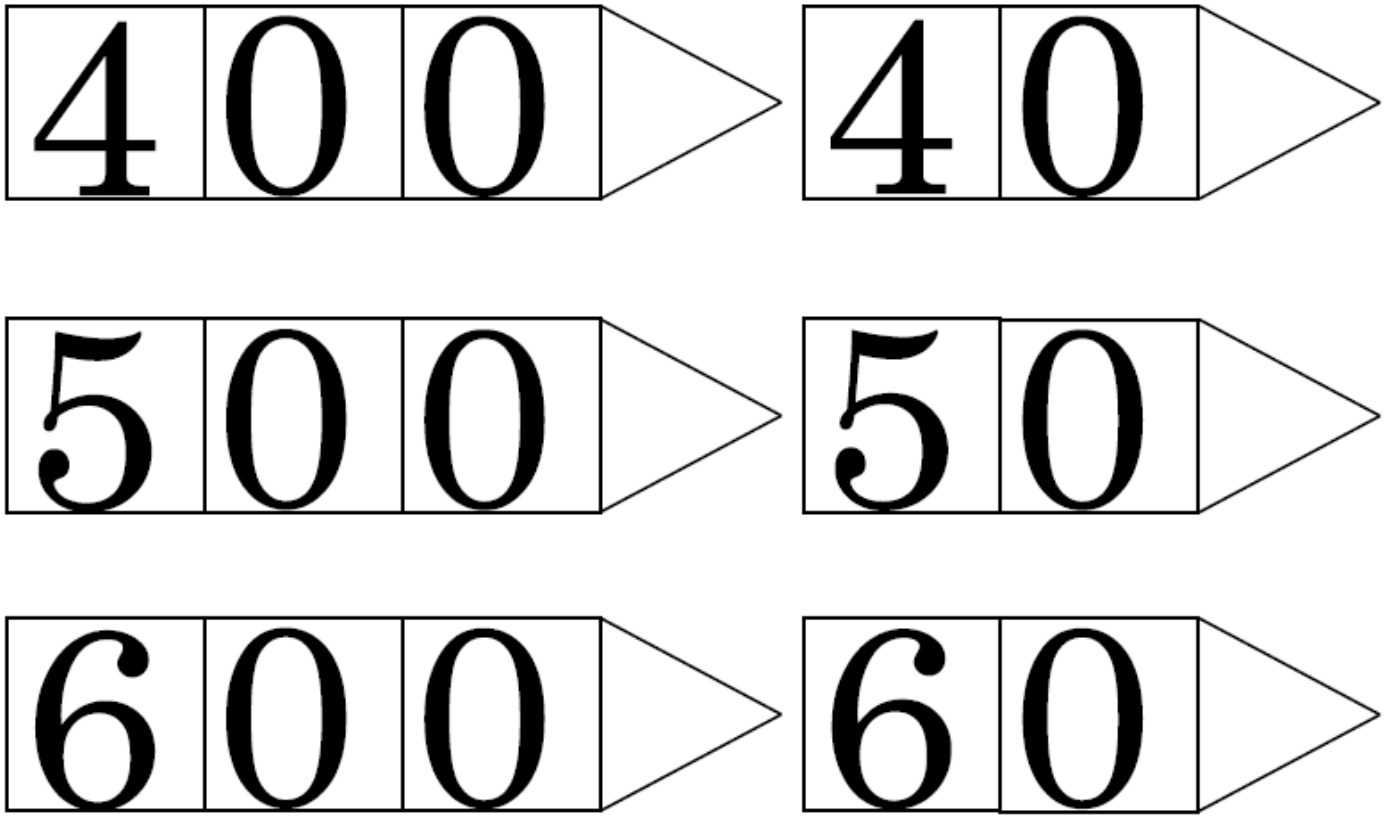

(Arrow cards taken from Numeracy Development Project Material Masters 4-14, NZ Maths)

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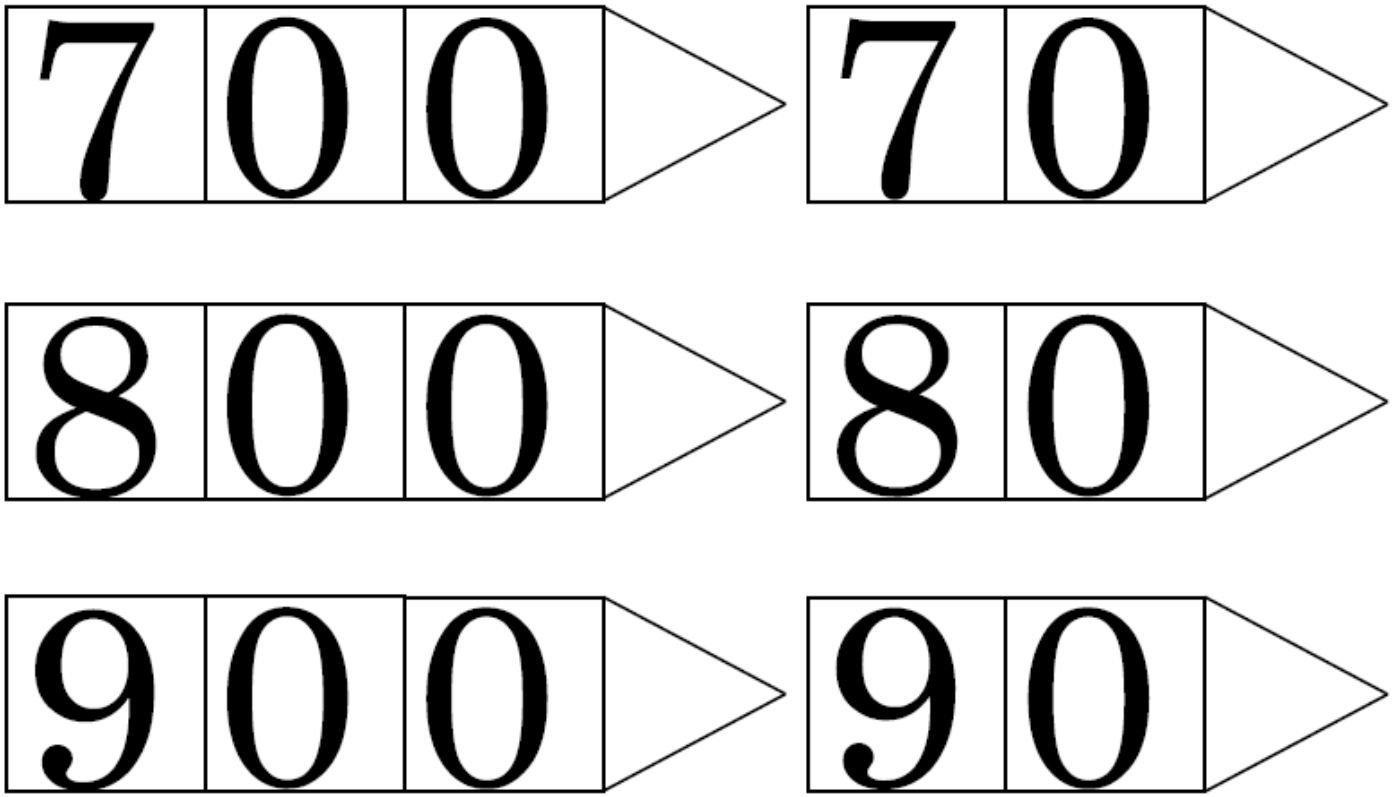

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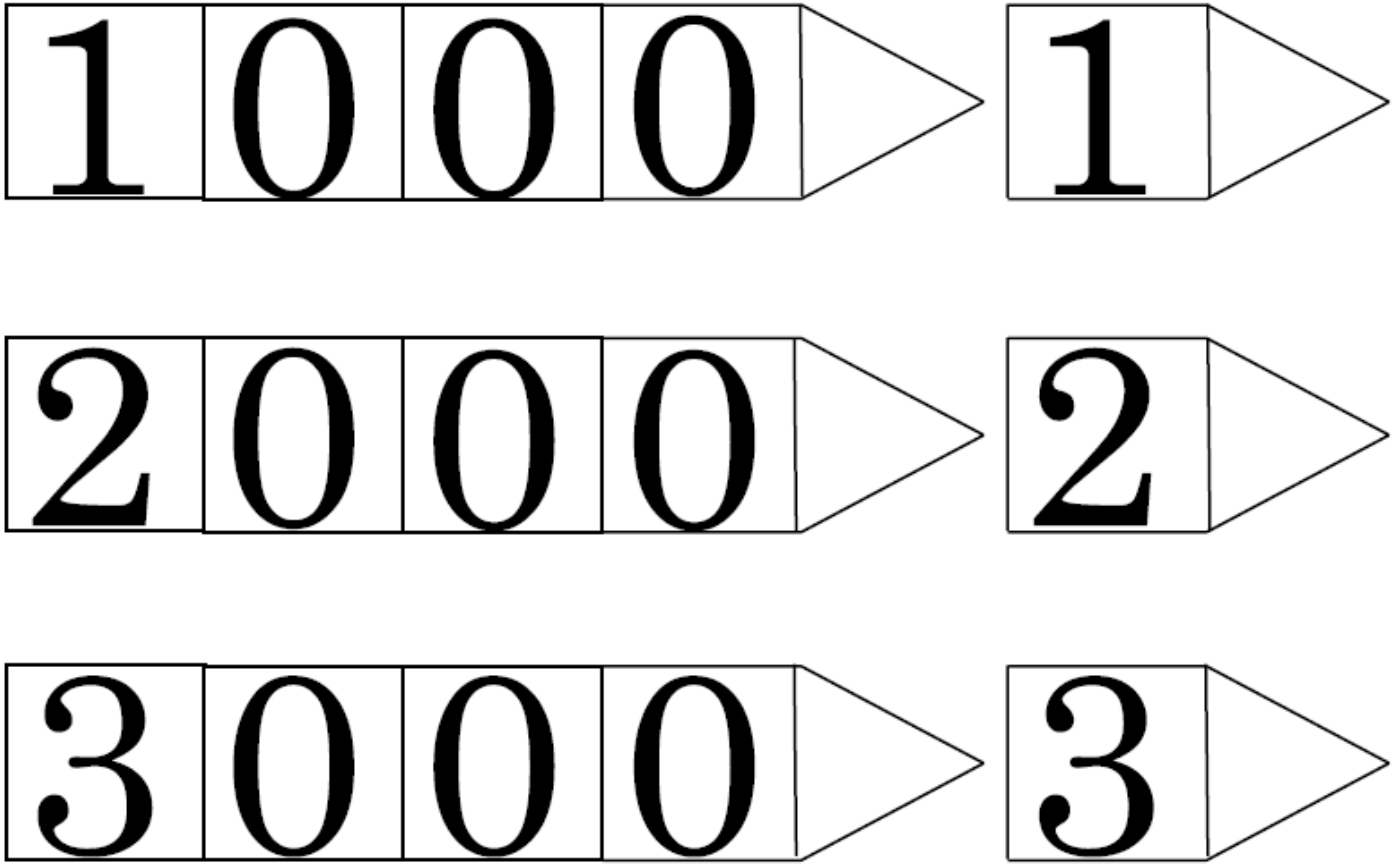

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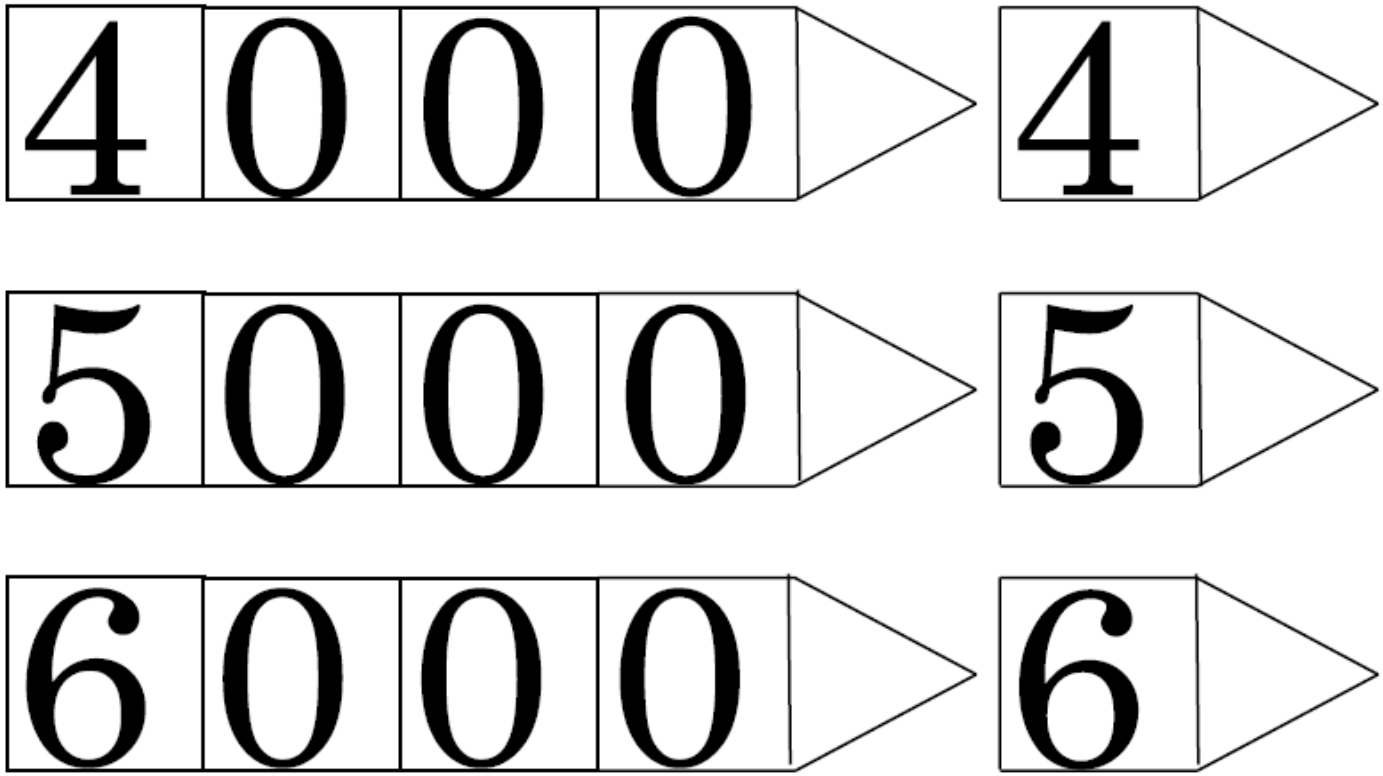

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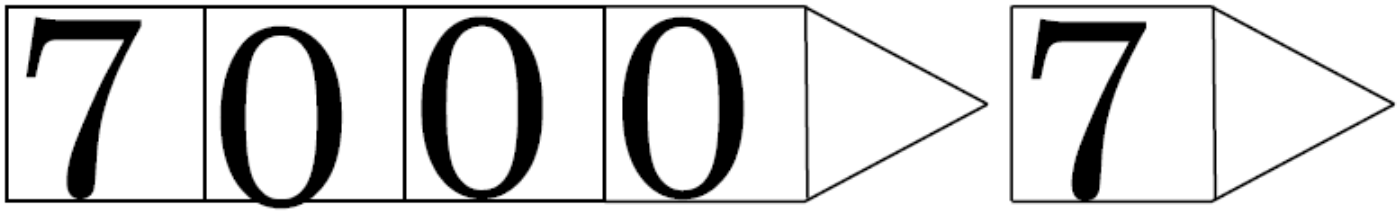

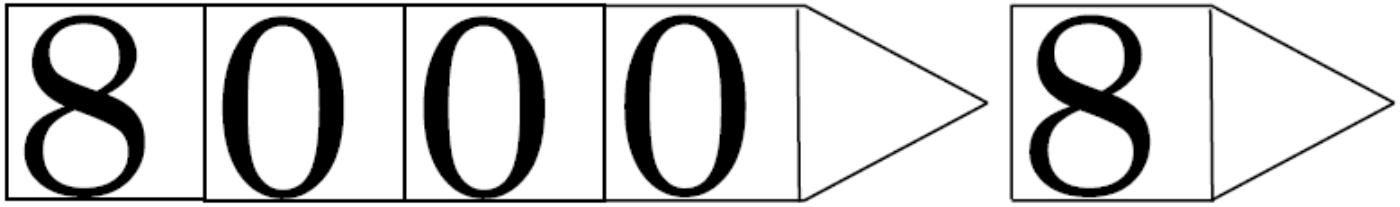

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