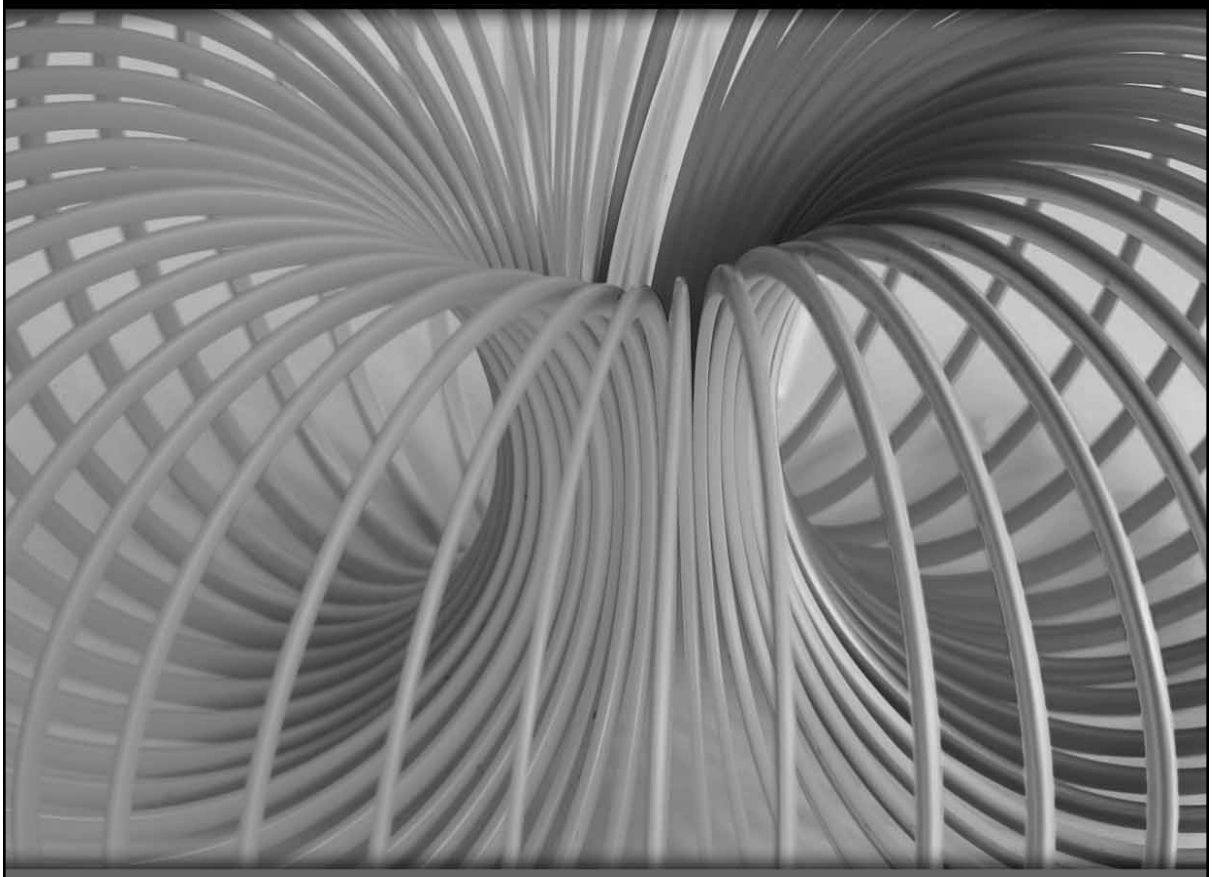
Math Stretches

Building Conceptual Understanding



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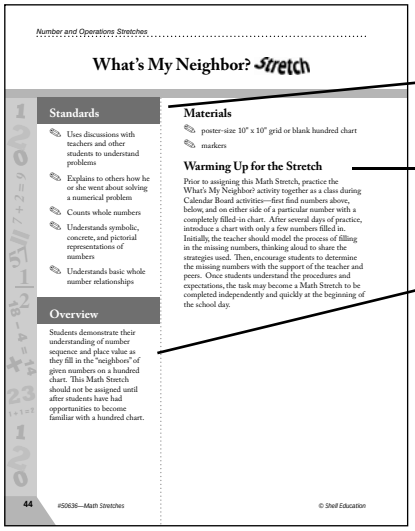
Number and Operations Stretches

What's My Neighbor? Stretch

Standards

- Uses discussions with teachers and other students to understand problems
- Explains to others how he or she went about solving a numerical problem
- Counts whole numbers
- Understands symbolic, concrete, and pictorial representations of numbers
- Understands basic whole number relationships

Overview

Students demonstrate their understanding of number sequence and place value as they fill in the "neighbors" of given numbers on a hundred chart. This Math Stretch should not be assigned until after students have had opportunities to become familiar with a hundred chart.

Materials

- poster-size 10" x 10" grid or blank hundred chart
- markers

Warming Up for the Stretch

Prior to assigning this Math Stretch, practice the What's My Neighbor? activity together as a class during Calendar Board activities—first find numbers above, below, and on either side of a particular number with a completely filled-in chart. After several days of practice, introduce a chart with only a few numbers filled in. Initially, the teacher should model the process of filling in the missing numbers, thinking aloud to share the strategies used. Then, encourage students to determine the missing numbers with the support of the teacher and peers. Once students understand the procedures and expectations, the task may become a Math Stretch to be completed independently and quickly at the beginning of the school day.

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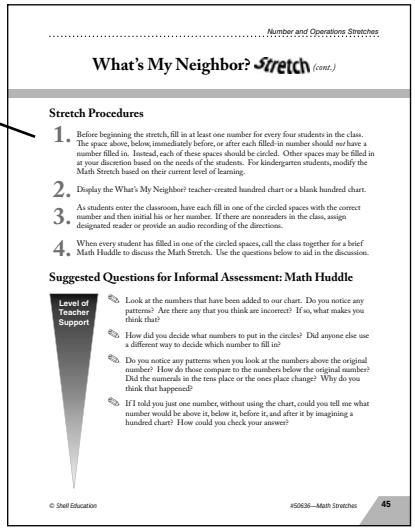
Each section opens with a list of the standards that are represented by the activity, followed by an overview of the stretch. A list of any materials and necessary prerequisite instruction (Warming Up for the Stretch) are included to help the teacher prepare the classroom and the students for the activity, minimizing the need for teacher assistance and allowing the students to have as much independence as possible to complete the task.

Simple, step-by-step procedures direct the teacher in how to conduct the Math Stretch. Included in this section are suggestions for extending the stretch for further mathematical exploration, as well as modifications for students who are nonreaders. The Math Huddle section suggests questions for informal assessment that a teacher can ask to provide varying levels of support and to facilitate a gradual release of responsibility (see more about Inquiry-based Learning on page 33).


Number and Operations Stretches

What's My Neighbor? Stretch (cont.)

Stretch Procedures

1. Before beginning the stretch, fill in at least one number for every four students in the class. The space above, below, immediately before, or after each filled-in number should *not* have a number filled in. Instead, each of these spaces should be circled. Other spaces may be filled in at your discretion based on the needs of the students. For kindergarten students, modify the Math Stretch based on their current level of learning.
2. Display the What's My Neighbor? teacher-created hundred chart or a blank hundred chart.
3. As students enter the classroom, have each fill in one of the circled spaces with the correct number and then initial his or her number. If there are nonreaders in the class, assign designated reader or provide an audio recording of the directions.
4. When every student has filled in one of the circled spaces, call the class together for a brief Math Huddle to discuss the Math Stretch. Use the questions below to aid in the discussion.

Suggested Questions for Informal Assessment: Math Huddle

Level of Teacher Support

- Look at the numbers that have been added to our chart. Do you notice any patterns? Are there any that you think are incorrect? If so, what makes you think that?
- How did you decide what numbers to put in the circles? Did anyone else use a different way to decide which number to fill in?
- Do you notice any patterns when you look at the numbers above the original number? How do those compare to the numbers below the original number? Did the numerals in the tens place or the ones place change? Why do you think that happened?
- If I told you just one number, without using the chart, could you tell me what number would be above it, below it, before it, and after it by imagining a hundred chart? How could you check your answer?

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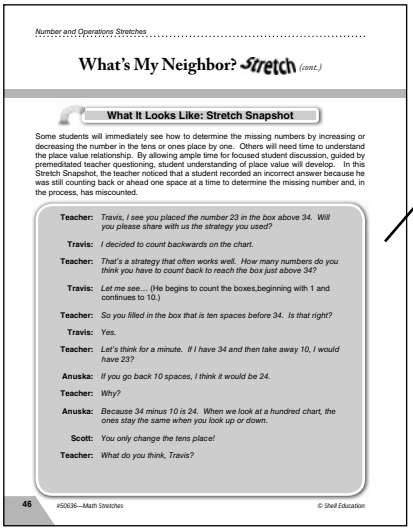
How to Use This Product *(cont.)*



Number and Operations Stretches

What's My Neighbor? Stretch (cont.)

What It Looks Like: Stretch Snapshot

Some students will immediately see how to determine the missing numbers by increasing or decreasing the number in the tens or ones place by one. Others will need time to understand the place value relationship. By allowing ample time for focused student discussion, guided by premeditated teacher questioning, student understanding of place value will develop. In this Stretch Snapshot, the teacher noticed that a student recorded an incorrect answer because he was still counting back or ahead one space at a time to determine the missing number and, in the process, has miscounted.

Teacher: *Travis, I see you placed the number 23 in the box above 34. Will you please share with us the strategy you used?*

Travis: *I decided to count backwards on the chart.*

Teacher: *That's a strategy that often works well. How many numbers do you think you have to count back to reach the box just above 34?*

Travis: *Let me see…* (He begins to count the boxes,beginning with 1 and continues to 10.)

Teacher: *So you filled in the box that is ten spaces before 34. Is that right?*

Travis: *Yes.*

Teacher: *Let's think for a minute. If I have 34 and then take away 10, I would have 23?*

Anuska: *If you go back 10 spaces, I think it would be 24.*

Teacher: *Why?*

Anuska: *Because 34 minus 10 is 24. When we look at a hundred chart, the ones stay the same when you look up or down.*

Scott: *You only change the tens place!*

Teacher: *What do you think, Travis?*

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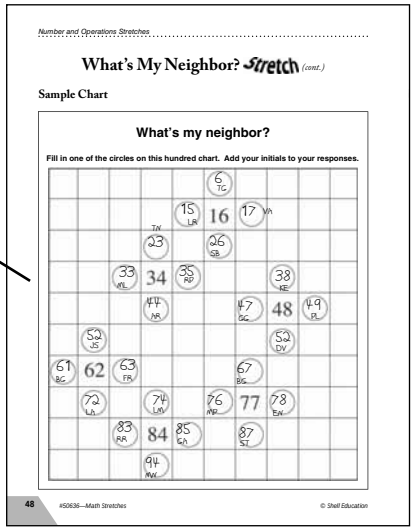
The Math Stretch concludes by providing the teacher with a model of how the Math Huddle may look in an actual classroom setting. This Stretch Snapshot illustrates the kinds of conversations teachers can have with their students, demonstrating how to extend students' thinking or uncover the sources of students' confusion about a concept. These dialogues model guided inquiry, in which the teacher facilitates the conversation so that students can make connections and discover underlying themes on their own.

A sample of the chart or poster created during each stretch is also provided. The specific information shown in each sample mirrors the content of the Stretch Snapshot. Templates of each chart or poster are available on the Teacher Resource CD, as well as electronic formats using interactive whiteboard technology.



Number and Operations Stretches

What's My Neighbor? Stretch (cont.)

Sample Chart

What's my neighbor?

Fill in one of the circles on this hundred chart. Add your initials to your responses.

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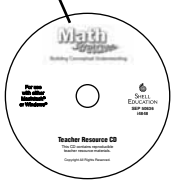

Number of the Day Stretch

Standards

- Understands that numerals are symbols used to represent quantities or attributes of real-world objects
- Understands symbolic, concrete, and pictorial representations of numbers
- Understands basic whole number relationships
- Adds and subtracts whole numbers
- Counts whole numbers

Overview

With the Number of the Day Stretch, students are asked to represent a teacher-selected "number of the day" in multiple ways that may include, but are not limited to, composing a problem to represent the number, drawing objects to represent the number, and demonstrating an understanding of place value through the representation of the number. Teachers determine the number based on the grade-level curriculum and knowledge of their students.

Materials

- chart paper
- markers
- assortment of manipulatives for counting

Warming Up for the Stretch

Introduce students to the Number of the Day activity during Calendar Board instruction. Teachers should model how to find alternate ways of expressing a "number of the day." This is best done through a think-aloud. Since some students may need to work with manipulatives to complete this task independently, teachers should demonstrate how to use manipulatives (base ten blocks, linking cubes, or place value boards) to create models of the number that then can be expressed with words, numerals, symbols, or pictures.

In subsequent days, repeat the task during Calendar Board using other numbers of the day and with increased student involvement in suggesting ways to represent the number. Display the Number of the Day charts created by the class during these lessons in the classroom for student reference when the activity becomes a Math Stretch to be completed by students independently. Teachers should determine the number of the day for this task based on the grade-level curriculum and the needs of their students.

Number of the Day Stretch *(cont.)*

Stretch Procedures

1. Display the Number of the Day chart. For nonreaders, designate a reader or use an audio recording of the directions.
2. Have students record with words, numerals, symbols, or pictures a representation of the number of the day. Then students add their initials. Students should choose a way to represent the number that is different from their classmates' responses. Manipulatives may be used to help students discover alternative representations of the number.
3. Once all students have contributed to the Number of the Day chart, call the class together for a Math Huddle to discuss the representations of the number that are displayed on the chart. Use the questions below to aid in this discussion.

Suggested Questions for Informal Assessment: Math Huddle

Level of Teacher Support

- Did you notice all the different ways we have represented the number of the day? Can you show us a representation using manipulatives? Is there a representation that you wonder about?
- Why do you wonder about that representation? Do you think it accurately represents the number of the day? Why? Does anyone else question that representation?
- Who would like to tell us about your mathematical thinking in coming up with your choice? Do others agree or disagree? Why?
- How does understanding place value help us create representations of numbers? How does understanding addition and subtraction help us?
- What connections do you make when you think of today's number? *(Answers might include, "That's my age," "That's how much money I have in my piggy bank," "That's how many students are in the class," or "That's how many fingers and toes I have.")*
- Why do you think it is important to be able to represent numbers in different ways? When do we usually use number words to represent numbers? When do we use numerals? When do we use pictures or diagrams? When do we use number sentences? Why do we sometimes choose one method of representation rather than another?

Number of the Day Stretch *(cont.)*

What It Looks Like: Stretch Snapshot

The Number of the Day Stretch offers teachers an easy way to assess both their students' number sense as well as their ability to represent numbers in multiple ways. Assessing students solely on the representations they create for the Number of the Day may prove to be misleading. Especially with young children, errors in actual representation may occur even when conceptual understanding exists. Since young students are easily distracted, especially in completing independent work, it is essential to engage in conversation with those who have minor errors to determine the causes of the errors.

The kindergarten class in this Stretch Snapshot is focusing on numbers up to ten. The teacher has encouraged students to use 5 and 10 as benchmark numbers. These students are beginning to see that 3 is two less than 5, and that 7 is two more than 5 or three less than 10. In this Math Stretch, the Number of the Day was 8.

At the start of the Math Huddle, the teacher noticed that Michael had drawn seven pennies on the chart in his attempt at representation. However, during previous observations of Michael as he counted objects, the teacher noted that Michael understood one-to-one correspondence and could count well beyond 10. He even seemed to understand the concept of using benchmark numbers. His teacher wondered whether his error in this task was due to a lack of understanding or was, instead, a careless error.

Teacher: *Young mathematicians, I am amazed by your work! Look how many ways you found to represent the number 8! Take a few minutes to look at our chart.* (The teacher gives students an opportunity to examine the many representations created by the class.) *Some of you chose to express the number 8 by drawing eight objects. Who chose to show the number this way? Let's see…Meagan, can you tell us about your work?*

Meagan: *I drew a pizza with eight slices. I counted each one as I drew it, so I know I have eight. See… 1, 2, 3, 4, 5, 6, 7, 8.* (She carefully points to each slice as she counts.)

Teacher: *Class, can you count with Meagan to be sure that she has eight slices?*

The class counts with Meagan as she points to each slice. The teacher is watching Michael to see if he is participating and counting each time a slice is touched, or instead is just rote counting. He appears to be correctly counting one-by-one as Meagan points to each slice.)

Teacher: *Michael, do you agree with Meagan?*

Number of the Day Stretch *(cont.)*

What It Looks Like: Stretch Snapshot *(cont.)*

Michael: *Yes. We just counted them, so we know there are eight—just like my eight pennies.*

Teacher: *You drew pennies! That makes me think of a connection. We've been talking about making trades with coins, haven't we? If I wanted to make a fair trade with you by giving you a nickel, how many pennies would you have to give me?*

Michael: *Five of them.*

Teacher: *Okay. Will you draw a circle around five of your pennies to show how many you could trade for a nickel?* (Michael counts five pennies and draws a circle around them. Then, he looks puzzled.)

Teacher: *What's the matter, Michael?* (The teacher provides wait time as Michael looks back at his work.)

Michael: *This isn't right. Eight is three more than five, but when I circled the five pennies, there are only two left.*

Teacher: *How can you figure out what's wrong?*

Michael: *I can count again. 1, 2, 3, 4, 5, 6, 7. That's only seven! I need to draw another penny.*

Teacher: *How do you know?*

Michael: *First, I knew that 8 was three more than 5. That didn't work—there were only two left after I circled the 5. So, I counted all of them again. I needed one more.*

In this Snapshot, the dialogue with Michael confirmed the teacher's earlier assessment that Michael understood one-to-one correspondence and, furthermore, is capable of using benchmark numbers.

Number of the Day Stretch *(cont.)*

Sample Chart

How many ways can we represent this number?

Use words, numbers, or pictures to represent this number. Add your initials to your representation.