Rainbow Number Lines

Grade 2

Lesson 207

Relevant chapters in the *Digi-Block Comprehensive Teacher's Guides:*
    Book II: Unit 2-4: Relating Single Blocks to Packed Blocks, pages 37–40
            Unit 2-5: Seeing Patterns in the Count, pages 41 – 44
    Book III:Unit 1-4: Seeing Patterns in the Count, pages 26 - 29
            Unit 1-5: Using the Number Line, pages 30 – 32
            Unit 1-6: Rounding and Ordering Numbers, pages 35 - 36

Lesson Overview

Students create a physical number line using blocks. They name quantities of blocks laid on the number line and check their answers. On their own number line worksheets, students color code certain number spaces. They create clue cards that record their color choices and the corresponding numbers.

Objectives

Thinking Skills: Students use strategies to count and name blocks on a number line: they count single blocks or they use a base ten "shortcut" to name quantities. Students connect the counting and base ten views of number as they count singles and/or tens and ones along the number line. Students construct and interpret a paper representation of a physical number line.

Mastery Skills: Students learn how to use hash marks to facilitate counting and locating numbers on a number line. Students explore ordinal numbers (e.g., ninth, sixteenth, etc.) to identify blocks.

Materials

Each student, group of students, etc. needs:
- 0-50 foam or paper number lines (Note: Use 0-100 number lines if students are ready)
- Single blocks and small holders
- Student-made number line from the blackline master
- Blank cards for recording color clues
- Crayons or markers, including a supply of "Digi-Block green"

Class Introduction   (10-15 minutes)

Count out a collection of 24 single blocks together. Display the number line, showing the side with numbers.
- Ask, **If I put all of these blocks on the number line beginning here (point to the left-hand side), where do you think they will end?**
- Have volunteers share their predictions. As they do so, ask, **Why do you think so? How do you know?**
- If students do not mention the hash marks on their own, ask, **Why do you think that some lines are darker and/or longer than others? How does this help us count the blocks?**

Grab a quantity of blocks *without counting them*.
- Place them on the number line and ask, **How many blocks are on the number line? How do you know?**
- Discuss students' strategies for naming the number. Some students may just read the number at the end of the row of blocks. Others may understand how to use the hash marks. Have these students explain how the hash marks are helpful. Some students may want to count all the single blocks to check these methods. Others may suggest packing the blocks to name the number.

When students are ready, show the side of the number line **without** numbers. Repeat examples similar to the ones above:

- Count out a collection of single blocks. Have students identify where they will end on the number line. Since there are no numbers, students will have to use the hash marks or count all the spaces one by one.
- Likewise, grab a quantity of blocks and lay them on the number line. Have students predict how many blocks are laid on the number line and then count them to check.

Always have students explain their thinking, drawing attention to the hash marks and counting strategies.

- Some students may continue to count by ones (1, 2, 3, …29, 30, 31, 32, 33, 34).
- Others many count by tens then tack on ones (10, 20, 30, . . . 31, 32, 33, 34).
- The goal is for students to finally "see" 3 tens and 4 ones and truly understand that it represents 34.

Have student name blocks other than the final (total) on the number line. Use ordinal language and position numbers. For example,

- Place 30 blocks on the number line.
- Name the quantity (30).
- Ask, **Where is the tenth block, or block #10? How do you know? Where is block #26 or the twenty-sixth block?**, and so on.

Have students construct their own number line to 50 using the blackline master. (It can be longer or shorter, depending on students' levels.)

- Locate block positions on the line, using actual blocks if needed. For example, have students point to block 14, or the fourteenth block.
- Mention that if they drew a picture of their number line, it would be a solid blue green line because of the color of the blocks.

Have students imagine that some the blocks are rainbow colors! Most of them are Digi-Block green, of course, but pretend that just a handful come in different colors. Explain that instead of making a solid Digi-Block green

number line, they will be able to put different colors at different numbers to make their own Rainbow Number Line.

- For example, block #10 is red! Have students identify where block #10 is and color the space red.
- Have students use 5 to 10 different colors and "secretly" continue coloring block spaces on their lines, each student making a unique line. Have them record each block number and color on their Rainbow Number Line clue card.
- Students then color in the remaining parts of the number line with the Digi-block green color.

After lines are colored and clue cards are complete, collect and display the lines for all students to view.

Collect and redistribute clue cards, so that students do not receive their own.

Have students study a set of clues and the displayed lines. Their task is to identify the number line that matches the clue card they possess. Finally, have them check the match with classmate designers.

After number line matches are made, ask

- **What were you thinking as you designed your number line, and recorded the Rainbow colors?**
- **What strategies did you use to identify your classmate's number line?**
- **Were there any number lines that were particularly challenging or easy to match? Why?**

Create a bulletin board, again mixing number lines and clues so that students may continue to practice identifying and discussing how numbers are located on the lines.

Assessment

Observe how students count blocks on the number line. Do they-
- Count by ones?
- Use the written numbers?
- Use the hash marks?
- Name tens then tack on ones?
- Name tens and ones?
- Pack the blocks?

Can students-
- Predict how far a quantity of blocks will extend along the number line?
- Identify blocks other than the final block? For example, can they identify block #9? The eighteenth block? The thirty-fifth block?
- Transfer from the physical number line to the paper representation? Can they "read" the number line without blocks? Can they write locations accurately (red = block #10).

Extension

- Make a longer number line to practice locating blocks >50.
- Collect real life examples of number lines (thermometer, measuring tape) and practice reading them.
- Make an ant's racetrack on adding machine paper strips. Place Digi-blocks end to end lengthwise to represent units. Make light marks to show each block, and dark hash marks to show where every tenth block ends. Draw symbols for racetrack locations at various points along the track. For example, draw a cup (to represent water break) at block # 15, a piece of bread (snack) at block # 36, bed (rest) at block # 24. Make a key to match symbols with their meanings and locations.