

# NUMBER LINE PUBLIC LESSON

## Description of Public Lesson

Goal of public lesson:

- a. Do children understand that the intervals along the number line (and between two numbers) need to be equally spaced?
- b. Can children focus on equal spacing of intervals while creating a ruler with a set end point? (Thus combining spatial sense, the idea of equal spaces, and ordinality)
- c. How do children compare and make sense of number lines of different lengths and different starting/end numbers?

**Materials:** rulers, paper strips of two sizes for students marked 0-10 marked with a marker, two paper strips for the lesson marked lightly for 0-8 and 0-13, markers for teachers, pencils, erasers

## Part 1 (5 min): Reviewing their ideas about rulers from previous lesson

*Teacher holds up ruler.*

**Last time we were together we made some rulers.**

**Tell me some things that you know about rulers.**

[If need be, prompt about spacing, start point of 0]

[Hear from 3 or 4 children or more if discussion is rich.]

## Part 2 (10 min): Making number line/ruler with set end point

- a) Making a ruler 0 – 8 (prepare with light marks so that the teacher is able to place numbers precisely for students to see the equal spacing and the middle)

**What number should I start with?**

*Teacher begins to make ruler/number line, and writes numbers: 0, 1, 2, 3 (we talked about putting lines above each number but maybe we should just see if students do that?)*

**What number do you think my ruler will end at?**

**How do you know?**

**OK, I'm going to write another number.**

*Write 4*

**Now what number do you think will be at the end?**

[Prompts: **What gave you that idea?** ]

**What is special about 4?**

[Listen for ideas about middle, balance, equal on each side]

*Continue to write the numbers to 8.*

**Were our predictions close? How can we prove that 4 is in the middle?**

- b) Making ruler 0 -13

**OK, now I'm going to be making another ruler and this time it's going to be a little different. It's going to have a different number at the end. I'm going to do a few more numbers and we'll see what you think the number at the end will be.**

*Writes numbers up to 7 - past halfway point.*

**What do you think our end number will be on this ruler/number line?**

'more than 10" "I think 11" "sometimes when you shrink the spaces..."

*Write in a few more numbers; stop at 11*

**Anyone want to change your guess?**

**What do you think it is?**

**Shall I finish?** *Writes in the other numbers to 13*

**Where's the middle? Turn to your partner and talk to each other about what is the middle and how can we check? Here are some rulers to help you with your thinking. Hand out rulers.** (Children may use rulers to support their thinking.)

### **Part 3 (15 min)- Students create their own rulers with set end point**

**Now it's your turn to create your VERY OWN ruler! You will have two rulers, one small and one big. Both will begin with 0 and end with 10. Your job is to fill in the missing numbers with a pencil.**

**You can choose how long your ruler is going to be AND even more exciting - you're going to be able to choose what number you want as your end point. The only "rule" is that you have to use a marker to write the zero and the end number. Everything in between you can use a pencil.**

**When you are making the two rulers how are the rulers going to be different?**

**What are some strategies you can use to make equal spaces?**

*Listen to ideas from at least 3 students. If they say nothing, say: Last time I*

**remember some people had different strategies that they used to get equal spacing. I want you to think about it and see what you're going to use today.**

**OK, now it's time for you to go to the table where your teacher is standing. You can get started on your ruler when you get to your table.**

*At the tables, children are given the option of choosing a short or long piece of paper. Allow students approximately 10 - 15 minutes to make a ruler.*

a) Teachers will reiterate that the children write the missing number using pencils. . Students can use erasers to make changes of use another strip of paper.

b) Teachers can ask -**What are you going to do to make the spaces you need? Tell me about your strategies for spacing.**

- d) Then ask, **What is your middle number going to be? How can you find out? Where would it go on your ruler? Tell us how you know?**
- e) If children finish early, ask them to choose their own end point and fill in the missing numbers.

**Part 4 (10 min) – Gather back on carpet for whole group discussion.**

*After 15 minutes, gather students on the carpet with their new rulers.*

[During the debrief, look for the big ideas: equal spacing, use of or recognizing middle, writing numbers in order, comparison – noticing how even though it is the same length, the numbers are different...]

**Place your ruler in front of you on the carpet and let's take a look at the ones next to you. What do you notice? How are they the same and how are they different?**

**Which ruler was easier to make – the smaller ones or the bigger ones? Why?**

Ask a student to share his/her ruler.

**How did you decide what kinds of spaces to use? What strategies did you use?**

**Did anyone use the middle number to help them get to the end point?**

**Extensions (if we have time):**

**What kinds of things can we use to measure using these rulers?**

**Which one would you use to measure this teddy bear?**

**Which one would you use to measure Zack?**

**Challenge – find an object in the room that is about the same length as your ruler.**