

Number Line - Locations

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To see a video clip of this lesson being implemented in a third grade classroom go to [Working on a Number Line - Third Grade](#).

Summary	Students place themselves at points on the number line. Main contexts: stairs, age, money, temperature, and pure number.
Goals	To introduce the number line representation.
Materials	A previously assembled "number line" (Going from -10 to $+20$ fixed onto a wall or hanging across the classroom), Overheads, Handouts.
Keywords	Contextualized Situations Full Class Discussion Hands-On Activity Negative Numbers Number Lines Production of Algebraic Expressions Production of Stories
Foci	What locations mean on the number line in various contexts.

Introduction:

A number line goes from about -10 to $+20$. The children themselves become numbers on the line and perform different "line dances" in the following lesson. By doing so they further explore additive operations and eventually begin to explore negative numbers. Students perform addition and subtraction operations by moving up and down the number line. They explore this representation using different contexts, such as age, money, temperature, candies, steps up and down the different floors at the school's staircase, etc. They begin to think about "shortcuts" or multiple addends that can be shorted to a single addend.

This class sets the foundations for much of what follows in mathematics. From the number line students will move to more schematized diagrams, with vectors representing amounts and operations on those amounts. There are two major reasons for using the displayed number line: (1) it allows children and the teacher to publicly demonstrate and witness how they are reasoning about a problem; and (2) it is often highly motivational—some children will love to clown around when strutting along the line.

Although we generally refer to the number line as containing numbers, it very often is used to represent measures, that is, measured (or counted) quantities such as money, age, time elapsed, candies, etc. When used in this way, it should be labeled both in terms of the attribute and its unit. For example, if the number line is used to display how much money Jon has, it should be labeled "Money (dollars)" or "Jon's Money (in dollars)" to specify the attribute and the currently used unit. This allows us to ask where to place Jon if he has 20 dimes, and so forth.

Activity Plan:

Locating Values and Numbers on the Number Line

1. The Stairs at the School

Before beginning, secure the number line across the front of the room (or a large enough, prominent space) so that the numbers are elevated around 3 to 4 feet off the ground (if a string), and just above the typical student's head (if the number line is fixed to the wall).

To begin the class, ask the students what they think it is. While they may have seen number lines in the past, they likely haven't seen one of this magnitude. Some responses might be: "it's a line", "it has numbers", or "the numbers go in order". Students may notice and comment on the negative numbers: the numbers "start again"; there are numbers "with a minus sign"; the numbers go down on this side.

More than anything else, it is important to listen closely to what students say about the number line. There will be many opportunities to use their responses to explore possible properties and issues.

Possible comments of students	Possible directions for exploration
"Sally (at -3) has more money than Sam (at +2)"	Negative numbers will not be understood initially by typical third grade children. Make sure that they see that spending more than one has lands one on the left side of the origin.
"The numbers stop at 100"	It is important to distinguish between the prop and the abstract idea of a number line. The prop may stop at 100, but the number line it stands for does not.
"I'm 8 and a half years old so I'll put myself on the 8"	Is one-half a number or an amount? Should we place you at 8 right along with Mary, who just had her birthday (and is 8)? Do you become 9 all of a sudden? (yes and no). Are there values between 8 and 9 years?

Ask two volunteers to pretend that they are standing on steps 4 and 7 on the stairs that go from the first floor to the second floor of the school.

Where would they end up if each one walks down 4 steps?

What if they walk down 3 other steps?

What was the difference between the two children at the beginning?

What is the difference between them now?

Engage the students in questions about the number line: Where does the number line end? Does it end at 20, or can we think of it as going on past 20? What could it go up to? What are the numbers lower than zero? Can it keep going past -10 in that direction? Introduce the term 'negative numbers' to the students. Negative numbers will be a part of their work during the Number Lines unit.

2. Amounts of Money

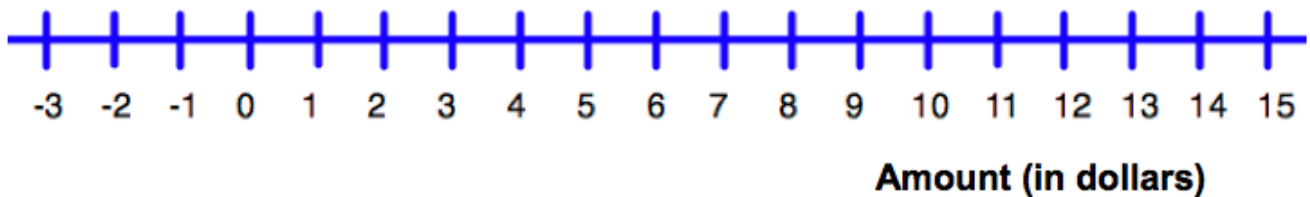
Have the students enact various scenarios for money on the number line using the overhead on page 1. Project the overhead on page 1 to record the results in a table.

3. Explain the Homework (Pages 2 & 3)

Explain what the students have to do.

Where does each person go on the number line?

	What we know	Amount they have in dollars <u>now</u>
Sandy	Has six dollars.	
Bob	Has eight quarters.	
Terry	Has nothing; and owes mother one dollar.	
Steve	If she gets 2 dollars more she will have 11 dollars.	



Name: _____ Date: _____

Put each person on the number line. Use their age today.

Person	What we know about the person	Age today (in years)
Franklin	Had his eighth birthday yesterday.	8 years
Max	Will be eight two years from today.	
Randy	Became eight years old three years ago.	
Shirley	Six months from now will be eight years old.	



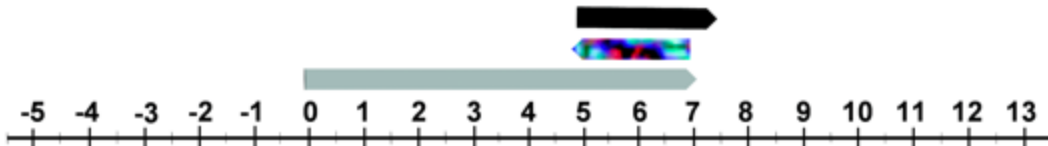
Age Today (in years)

Overhead and Homework

(Page 3)

Name: _____ Date: _____

The following number line represents Chandra's money from last Saturday:



Write a story about Chandra's money. How much does she start with? How much does she end with? What happened to her money over the day?

Write an expression about Chandra's money using numbers.

Can you think of a different story for the number line that is about something other than money?