

TAKE IT TO THE MAT

A NEWSLETTER ADDRESSING THE FINER POINTS OF MATHEMATICS INSTRUCTION

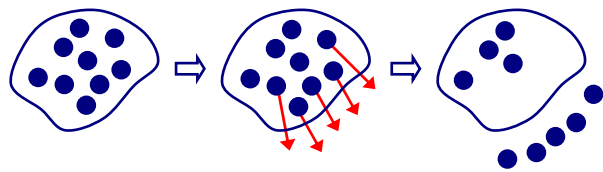


Southern Nevada Regional Professional Development Program
March 2005 — Elementary School Edition

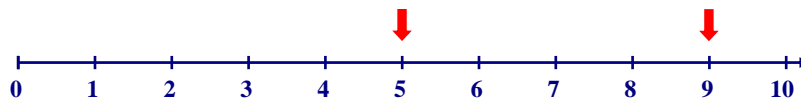
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What is subtraction? That's not a rhetorical question—please answer. What is subtraction? If you said, "Take away," you're right—but, only partially. We often model subtraction as "take away" and that is an appropriate model, but it is only one way of looking at subtraction. In this issue of *Take It to the MAT*, we'll examine subtraction from a different angle, and set the stage for its connection to other topics in the curriculum.

Let's quickly use the "take away" model of subtraction so we have a frame of reference for the rest of our discussion. What is $9 - 5$? We would say it's "nine take away five." That is, we have nine objects and we take five away, then look at what's left. There are four left. In this case, we are looking at a group of discrete objects and remove them from the field of view.

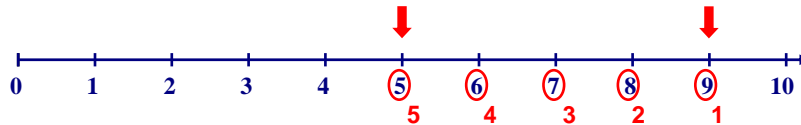


Another model of subtraction is that of difference or distance. To model this, we will use a number line. In the case of $9 - 5$, we start by locating the points 5 and 9 on the line.

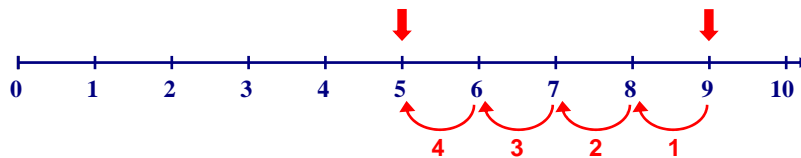


Now, to find the difference between them—that is, the distance between them—which way do we count, up or down? Does it matter? *What* do we count, numerals or spaces? Does that matter?

Let's count numerals, going down from 9 to 5. Use your fingers if you need. *Nine, eight, seven, six, five* (see below). I'm holding up five fingers, so $9 - 5 = 5$. Wait, that's not right. But that is what some kids do. Even if they count up: *five, six, seven, eight, nine*, they go awry.



Now, we'll count spaces, or "jumps," from 9 down to 5. *Nine to eight, eight to seven, seven to six, six to five* (see below).



Alternately, we could jump up: *five to six, six to seven, seven to eight, eight to nine*. Four spaces—four jumps. So, $9 - 5 = 4$. The difference between five and nine is four.

Understanding subtraction as the "difference" between two quantities involves the reasoning skill of comparison. Conceptually it is a model we can begin building on through flexible use of language and multiple representations of subtraction. This leads to the ability to use and solve problems involving phrases such as, "how many more?" In what situations do we ask students to use such a phrase?