Many kindergarten and 1st grade classrooms have a number line along the classroom wall and on every child's desk. However, research has shown that *number lines* are conceptually too difficult for young children and instead we should be using *number paths* until a child is in 2nd grade (Fuson, et.al., 2009). A number path is a count model; the numbers are represented by a rectangle and each rectangle can be counted. A number line is a length model; each number is represented by its length from zero. With a number line children have to count the length units and not the numbers. The number line model makes it difficult for young children to see the units whereas in the number path the units are easy to recognize. With a number line, some children start their count with zero and are off by one. Some count the space between the numbers and when they end their count their finger is between two numbers (count 4 spaces and your finger is between the 3 and 4) so they are unsure which number to use. Both of these errors do not occur when using a number path. Young children are still making sense of numbers, we do not want to use models that confuse them; instead we want models that help solidify and build their understanding.

Jerome Bruner (1966) identified a progression that children go through to help them make sense of the formal symbolism we use in mathematics:

Enactive – using tangible items to model the problem; the MathRack, cubes, acting it out, etc.
Iconic – representing what they did in the enactive phase with an icon (tally marks, circles, etc.) on paper. This could be drawing it or showing it on a number path.
Symbolic – writing the formal signs and symbols

It is important that we allow children to solve problems in the enactive phase, but we do not want them to stay in that phase forever. As they experience the problem tangibly, we want to show them ways to notate that on paper which reflect what they did in the enactive phase. For some children we need to be very explicit about helping them see the connection between what they notated on paper and what they did with the manipulative. I also have them write the numeric version of what they did. This helps them make the connection between all three representations of the problem (enactive, iconic, and symbolic).

Whenever you use manipulatives in your classroom you have to be cautious that the manipulative does not become a crutch. The number path and number line are powerful tools that give students the iconic bridge to make the leap from the manipulatives we use to the written symbols. Manipulatives are an excellent way to help build students' conceptual understanding. Unfortunately, when we use manipulatives continually without helping students connect them to the formal mathematical ideas we need them to understand, the manipulative can become a crutch that they feel they need in order to solve problems.

The next page of Number Paths are designed to be printed on 11x17" paper.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20