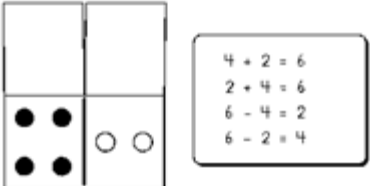
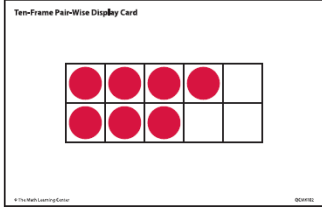
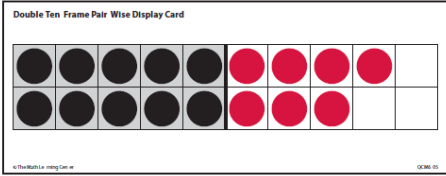
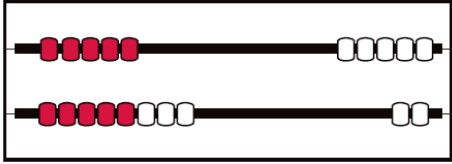
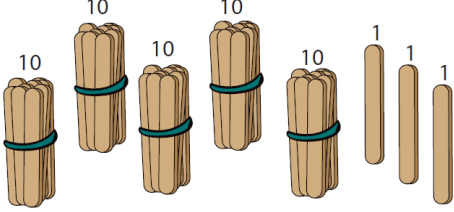



Kindergarten

The models used in Kindergarten are used to help students understand numbers, make sense of relationships among numbers and begin to develop strategies for addition and subtraction.

First Grade

The models in 1st grade are used to help students compose and decompose numbers, make sense of relationships among numbers, understand place value, develop strategies for basic addition and subtraction, and begin to add and subtract with multi-digit numbers.

| GRADE | MODELS | PICTURE | HOW AND WHY THE MODEL IS USED |
|-------|----------------------------------|---|--|
| | Dominoes |  <p>The image shows two dominoes. The left domino has four black dots, and the right domino has two white dots. To the right is a small grid containing the following math facts: $4 + 2 = 6$ $2 + 4 = 6$ $6 - 4 = 2$ $6 - 2 = 4$</p> | These are used to help students instantly recognize quantities and to model addition and subtraction. |
| | Ten Frames |  <p>A ten-frame with 10 cells arranged in two rows of five. The first row is completely filled with red dots. The second row has three red dots in the first three cells, and the last two cells are empty.</p> | Ten-frames help students with quantities up to 10 without counting and help students see numbers in terms of their relationship to landmark numbers of 5 and 10, building a solid foundation for addition and subtraction facts to 10. They encourage seeing doubles, counting by 2's, and identifying odd and even numbers. |
| | Double Ten Frames |  <p>A double ten-frame consisting of two ten-frames side-by-side. The left ten-frame is completely filled with black dots. The right ten-frame has six red dots in its first three rows (two in the first row, two in the second, and two in the third), and the last row is empty.</p> | Double ten-frames help students understand the teen numbers and 1 ten and some more ones since cards show one filled ten-frame and a second frame of more dots or cubes. Its helps develop place value as the students see the connection of 10 ones as 1 ten. |
| | Number Rack |  <p>A number rack with two horizontal strings of 10 beads each. The top string has 5 red beads on the left and 5 white beads on the right. The bottom string has 5 red beads on the left, 5 white beads in the middle, and 5 white beads on the right.</p> | Students use the number rack to create and actively manipulate numbers between 0 and 20. It is used to model a given number and then as a way to model and solve problems. It helps students see that one number can be a combination or sum of 2 or more other numbers. For example, students might see 13 as one group of 10 and 3 more. The model is made of 2 strings of 10 beads; each string broken into a group of 5 red and 5 white beads. Because of the different groupings, students can think in groups of 2, 5 and 10. Beads start at the right hand side and are slid to the left when in use. |
| | Bundles and Sticks |  <p>The image shows five bundles of ten sticks each, and three individual sticks. Below the bundles and sticks is the text: "53 as 5 bundles of 10 and 3 singles".</p> | This model supports the understanding of place value by clearly separating groups of 10, while also making it possible for students to count the sticks in each group as needed. Later, students use them to develop models and strategies for double-digit addition and subtraction based on regrouping. |
| | Number Line and Open Number Line |  <p>The image shows a vertical number line with 23 and 34 written next to it, and 57 written below the plus sign. To the right is an open number line starting at 23 and ending at 57. Jumps of +10 are shown from 23 to 33, 33 to 43, and 43 to 53. A final jump of +4 is shown from 53 to 57. The text "Jumping Strategy" is written below the open number line.</p> | At first, the number line is used to represent numbers in order. Later, it is used to develop and model strategies for adding and subtracting. The open number line allows students to break up the line as they see fit; since they no longer need to count by 1's, first graders' number lines show strategies that involve a flexible approach to working with tens and ones. |

Second Grade

The models in 2nd grade are used to help students structure number, continue to develop and apply place value understandings, and develop efficient strategies for computing with multi-digit numbers.

Third Grade

The models in 3rd grade are used to help students develop strategies for computing with multi-digit numbers, with a focus on multiplication and division.

Fourth Grade

The models in 4th grade are used to help students develop efficient strategies for computing with multi-digit numbers, as well as analyzing fractions, and decimals.

| GRADE | MODELS | PICTURE | HOW AND WHY THE MODEL IS USED |
|-------|------------------------------------|---------|---|
| | Number Line and Double Number Line | | <p>Students in 4th grade will use the number line to compare and order fractions and decimals. By reasoning about the relationships between the numbers, students place fractions and decimals on a number line given the position of other numbers already placed. In addition, students will use paper strips, egg cartons, geoboards and base ten pieces to model, read, write, compare, compose and decompose fractions.</p> |
| | Open Number Line | | <p>The open number line is used to show how repeated addition is related to multiplication. It is also used to model addition and subtraction strategies such as give and take or constant difference.</p> <ul style="list-style-type: none"> • Give and take is moving one part of a number to the other numbers to make addition easier. • Constant difference is adding or subtracting the <u>same value</u> to both numbers to make the subtraction easier |
| | Array or Area Model | | <p>Students build on this model from 3rd grade by continuing to work with multiplication and beginning division. They expand the model by using closed arrays, base 10 and linear pieces, and then open arrays.</p> <ul style="list-style-type: none"> • Closed array- they count each square units by 1. • Base 10 and Linear array- the area is modeled in bigger chunks, tens and ones, and the dimensions are defined by the linear pieces helping students distinguish between area measures and linear measures. • Open array- arrays are chunked together in pieces that are convenient and efficient for the problem. <p>While students will discover many ways to solve multiplication and division problems, the array model provides a way for them to discuss their strategies with one another, decompose (break apart) the numbers, apply the distributive property, and identify partial products.</p> |
| | Ratio Table | | <p>Ratio Tables in 4th grade continue to build an understanding about multiplication and the relationships between numbers. Later, the ratio table becomes a tool for students to use when problem solving, computing multiplication, division, and fraction problems, as well as make conversions. This model will continue to be used in higher grades as well.</p> |
| | Base Ten Area Pieces | | <p>Base ten area pieces are important in introducing the standard way to add and subtract because they focus on place and value. Because this model was in 3rd grade, students in 4th grade are expected to transition very quickly from base 10 pieces to numbers. In addition, base 10 pieces can be used to model fractions when the large square is assigned a value of one.</p> |

Fifth Grade

The models in 5th grade are used to help students develop efficient strategies for computing with multi-digit numbers, fractions and decimals.

