A close-up photograph of a pencil and a ruler on graph paper. The pencil is orange and sharpened, lying diagonally across the frame. The ruler is yellow and positioned above the pencil. The background is a grid of graph paper with some faint numbers visible. The overall lighting is warm and slightly blurred.

**EUREKA MATHEMATICAL MODELS
AND STRATEGIES
SECOND GRADE**

Rio Rancho Public Schools

“Say Ten” Counting with the Rekenrek

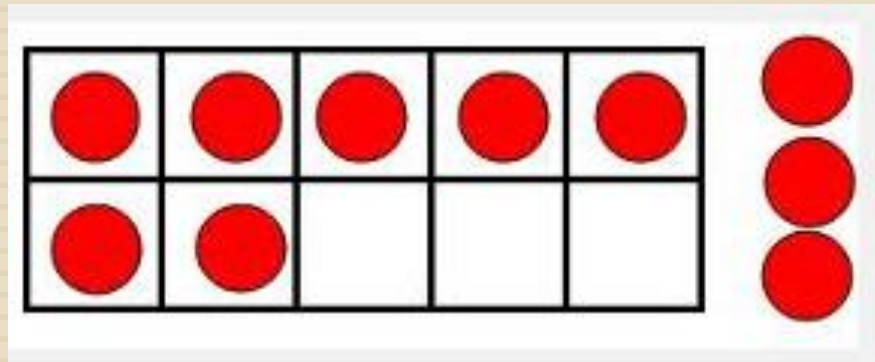
Students will use a **Rekenrek** to count the “**Say Ten Way**”. A Rekenrek is a visual tool that has a 5 and 10 structure, with a color change at 5 which elicits the visual effect of grouping 5 and 10. Using the Rekenrek and counting the “Say Ten Way” supports student’s understanding of place value and the value of a number.



<http://greatminds.net/maps/math/video-gallery/g2m1-ta-l2-1>

Five Groups (Ten Frames)

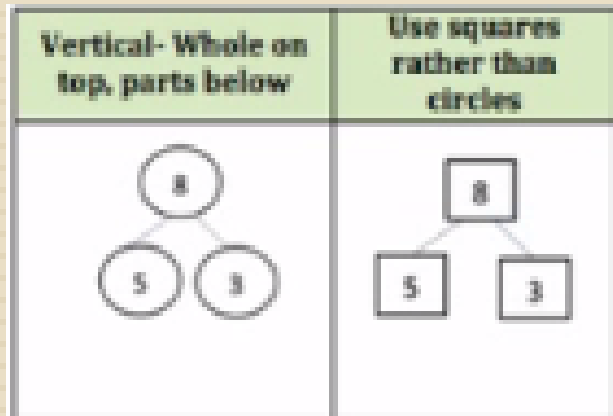
Ten Frame is a 2 by 5 grid (array) used to develop an understanding of concepts such as 5-patterns, number combinations to 10, and adding and subtracting within 20.



<http://greatminds.net/maps/math/video-gallery/addition-and-subtraction-with-five-groups-ten-frames>

Number Bonds

Number bonds help students see that a number can be “broken” into pieces to make computation easier. With number bonds, students recognize the relationships between numbers through a visual model that show how the numbers are related.



<http://www.cleanvideosearch.com/media/action/yt/watch?v=SV2lhkPaapk>

Number Bonds: Addition

Number bonds are used as a support for mental math such as understanding the “**Make 10**” strategy.

① $29 + 16 = \underline{45}$

$\underline{30} \quad 1 \quad \underline{15}$

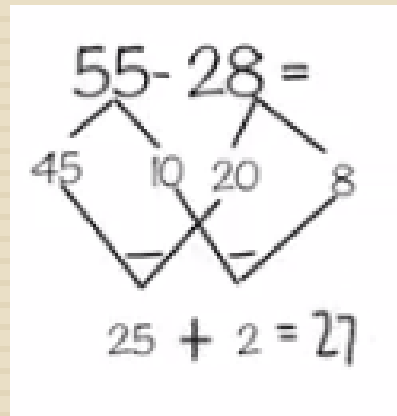
$30 + 15 = 45$

The image shows a handwritten note on lined paper. At the top, it says '+ Adding using + Number Bonds'. Below a dotted line, it shows the equation 29 + 16 = 45. A red circle is drawn around the 29, and a red line connects the 9 to the 1 in 16, with an arrow pointing to the 10 in 30. Another red line connects the 6 to the 5 in 15. The final equation 30 + 15 = 45 is written in red.

<https://www.youtube.com/watch?v=XMCr-avfe10>

Number Bonds and Subtraction

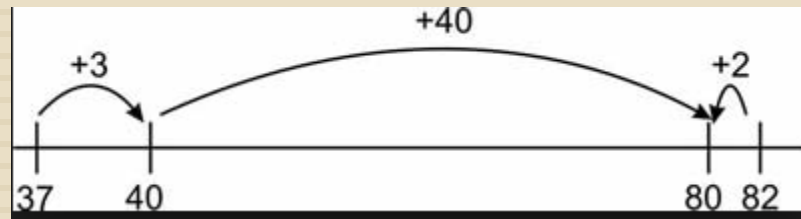
Number bonds/branching can be used to subtract without having to regroup or use the traditional algorithm.



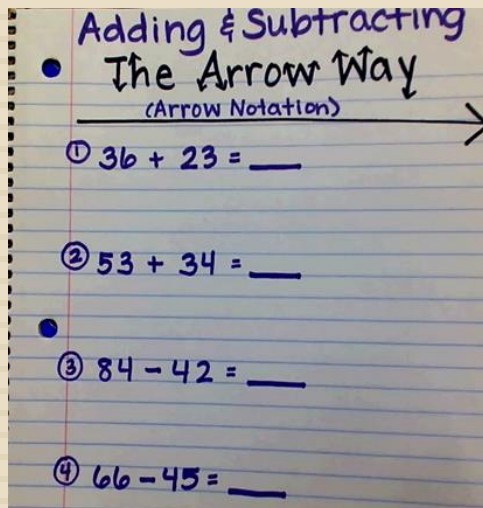
<http://www.cleanvideosearch.com/media/action/yt/watch?v=6GOOjx2Zbq0>

Number Line and Arrow Method

Number lines and arrow method are visual models used to add and/or subtract instead of using the traditional algorithm.



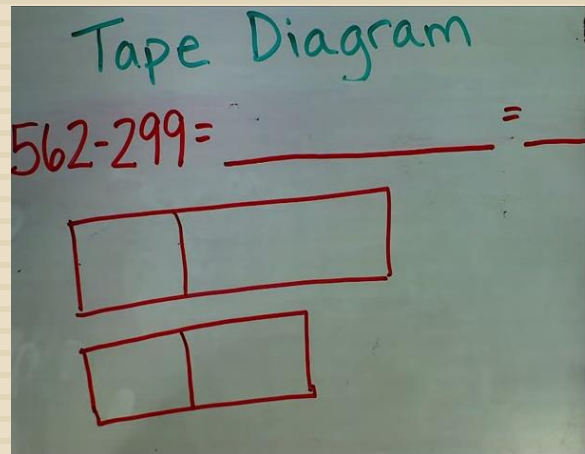
<https://www.youtube.com/watch?v=-YiPlwCZmc0>



<https://www.youtube.com/watch?v=Ue7y6nSleVk>

Tape Diagram: Compensation


A **Tape Diagram** is a model for showing the **compensation strategy** for subtraction. **Compensation** is a mental strategy using friendly numbers and making it easier to solve the given problem.



<https://www.youtube.com/watch?v=2q-q4l8CfvU>

Hide Zero Cards: Representing Standard, Expanded, and Unit Forms

Hide Zero or Arrow Cards are used to support understanding of place value.

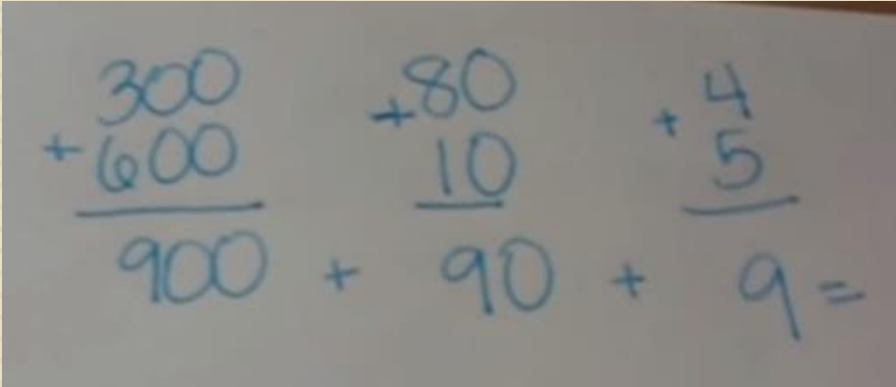


The diagram illustrates the number 4,137 broken down into its place value components using four arrow-shaped cards. The first card is orange and contains '4000'. The second is blue and contains '100'. The third is green and contains '30'. The fourth is yellow and contains '7'. Below the cards, the text reads: '4 thousands, 1 hundred, 3 tens, 7 ones' and the equation $4,000 + 100 + 30 + 7 = 4,137$.

<https://learnzillion.com/lessons/3478-use-expanded-form-to-understand-place-value-of-3-digit-numbers>

Horizontal/Expanded Notation: Addition

Expanded/Horizontal Notation is a strategy requiring students to understand the value of digits in a problem and adding like units with like units (hundreds and hundreds, tens and tens, ones and ones).

$$\begin{array}{r} 384 \\ +615 \\ \hline \end{array}$$


The image shows a handwritten example of expanded notation for the addition problem 384 + 615. It is written in blue ink on a grey background. The numbers are broken down into their place values: 300 + 600 for the hundreds, 80 + 10 for the tens, and 4 + 5 for the ones. Each addition is shown in a separate column with a horizontal line under the sum of the two numbers in that column. The final result is 900 + 90 + 9 = 999.

$$\begin{array}{r} 300 \\ +600 \\ \hline 900 \end{array} + \begin{array}{r} +80 \\ 10 \\ \hline 90 \end{array} + \begin{array}{r} +4 \\ 5 \\ \hline 9 \end{array} =$$

<https://www.youtube.com/watch?v=WEelkIvsNC4>

Total Below (Partial Sums)

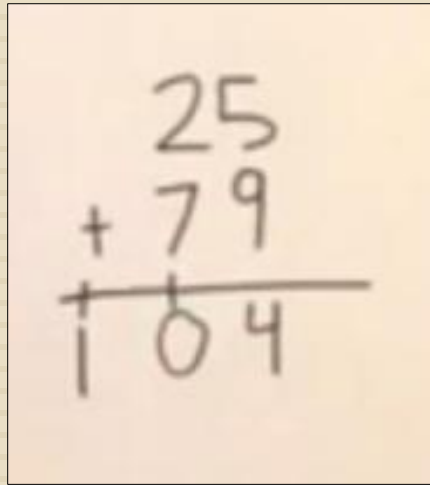
The Total Below method is similar to expanded notation in horizontal form. The difference is the students solve using a vertical form. This method requires students to add like values (hundreds and hundreds, tens and tens, ones and ones) in vertical formation.

$$\begin{array}{r} 56 \\ + 27 \\ \hline 70 \\ 13 \\ \hline 83 \end{array}$$

<https://www.youtube.com/watch?v=rmLqaGhikcY>

New Groups Below (Addition)

New Groups Below method is similar to the traditional algorithm. The difference is where we note the new group (the digit we are “carrying over” to the next column).



A handwritten addition problem on a light pink background. The numbers 25 and 79 are stacked vertically with a plus sign to the left. A horizontal line is drawn below the 9. Below the line, the digits 1, 0, and 4 are written in the same columns as the 2, 7, and 9 respectively, representing the sum 104. The '1' is positioned below the '2' column, the '0' is below the '7' column, and the '4' is below the '9' column.

Second graders are **NOT** expected to be fluent with the standard algorithm. This method allows for an easy transition to the traditional algorithm.

<https://www.youtube.com/watch?v=bbvGzkydcG0>

Place Value Disks (Number Disks)

Number disks are non-proportional units used to develop place value understanding. The numbers on the disks determine the value. Number disks are used in Grades 2 – 5 when modeling addition, subtraction, multiplication and division.

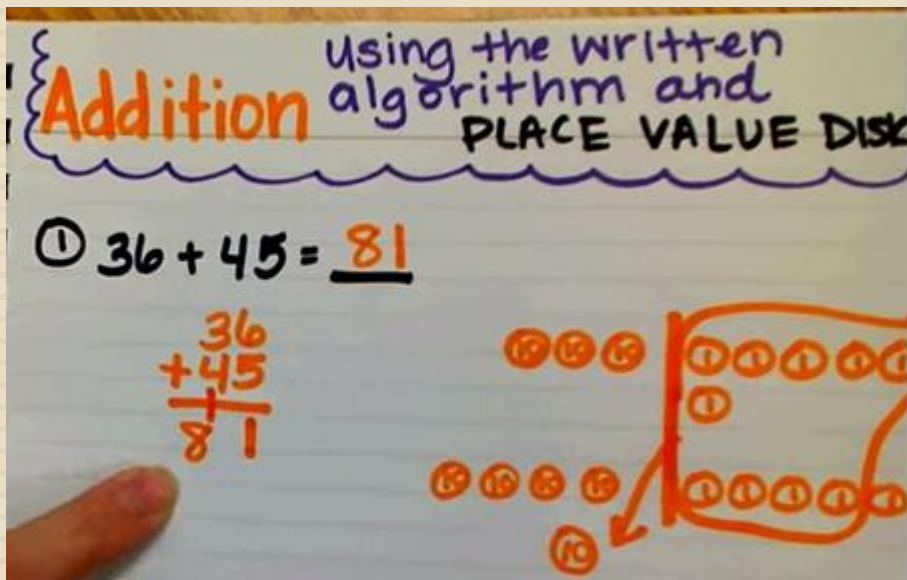


<http://greatminds.net/maps/math/video-gallery/introduction-to-place-value-disks>

Place Value Chart and Number Disks:

Addition

Number disks are non-proportional units used to develop place value understanding.



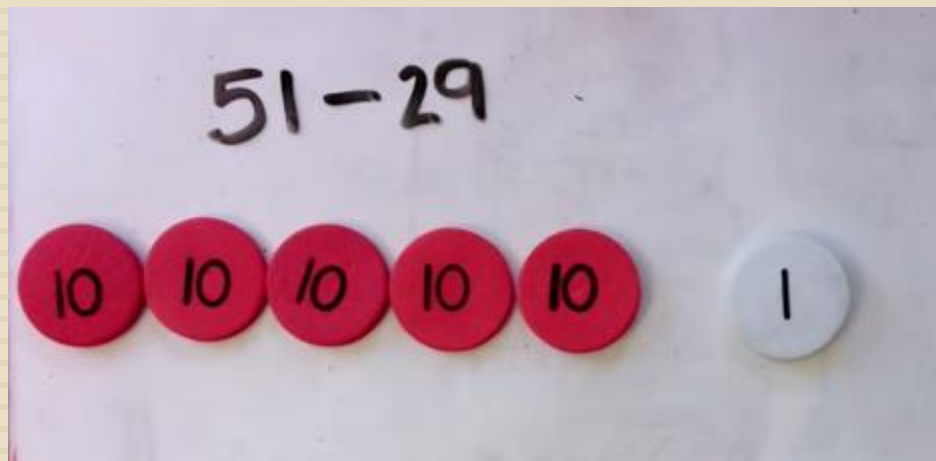
The standard algorithm is shown with the number disks to develop understanding of the algorithm. Second graders are **NOT** expected to be fluent with the standard algorithm.

<https://www.youtube.com/watch?v=rCU51HwpZ0o>

Place Value Chart and Number Disks:

Subtraction

Number disks are non-proportional units used to develop place value understanding. The numbers on the disk determines the value printed on it.

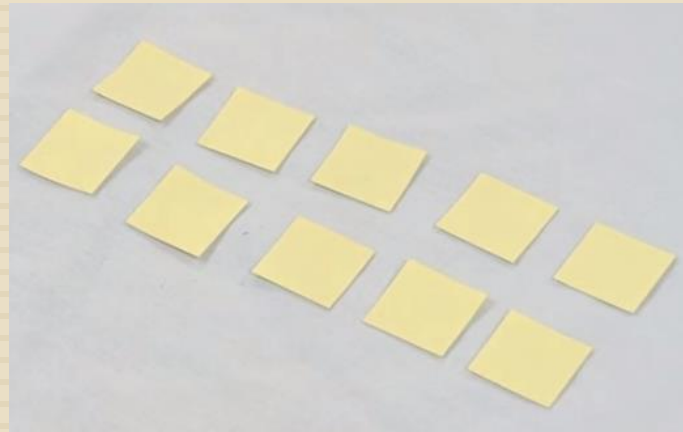


The standard algorithm is shown with the number disks to develop understanding of the algorithm. Second graders are **NOT** expected to be fluent with the standard algorithm.

<https://www.youtube.com/watch?v=u8k9QwOAVs0>

Array Patterns

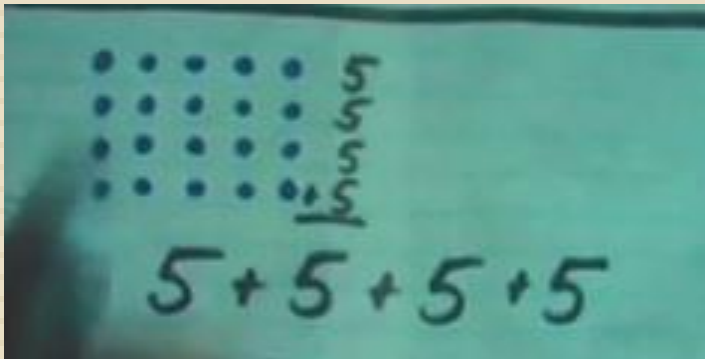
An **array** is an arrangement of a set of objects organized into equal groups in rows and columns. Arrays help make counting easy. Counting by equal groups is more efficient than counting objects by one.



<http://greatminds.net/maps/math/video-gallery/array-patterns>

Arrays: Multiplication

An **array** is an arrangement of a set of objects organized into equal groups in rows and columns. Arrays reinforce the meaning of multiplication as **repeated addition** and the meaning of division.

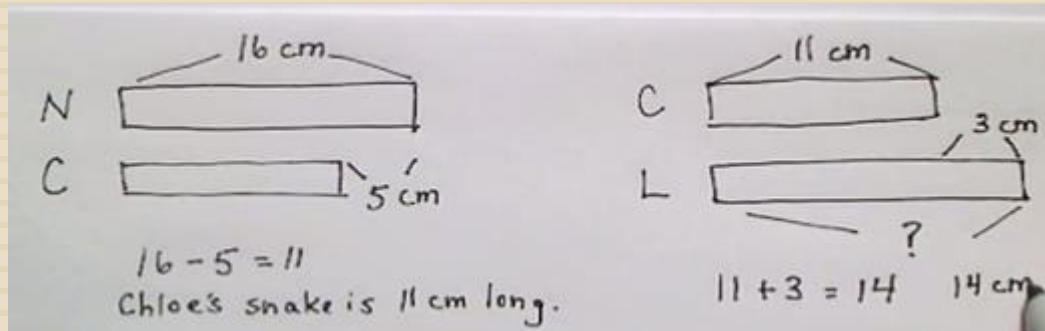


Note: The multiplication symbol “x” is not used in second grade so students build understanding of multiplication as repeated addition.

https://www.youtube.com/watch?v=JR-1K2Z_nzo

Tape Diagrams: Read, Draw, Write

Tape Diagrams and the **RDW** process supports students ability to solve word problems through modeling. The process includes reading the problem, drawing a model (picture), writing a number sentence/number bond and answering the question.



<http://greatminds.net/maps/math/video-gallery/g2m2-tc-l7-1>

Thank You to the following teachers and Instructional Coaches for collaborating on this project.

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