

Models and Representations

Ways to represent addition and subtraction:

Throughout the module, students are encouraged to be flexible in their thinking and to use multiple strategies in solving problems. These strategies are described below.

Number Bonds

Students continue to add and subtract using number bonds to compose or decompose numbers.

$$29 + 42 = 71$$

$$30 + 41 = 71$$

$$71 - 29 = 42$$

$$30 - 29 = 1$$

$$41 + 1 = 42$$

The Arrow Way

Students learn the arrow way to record their mental math and to show changes by multiples of ten and one.

$$29 + 42 = 71$$

$$29 \xrightarrow{+40} 69 \xrightarrow{+2} 71$$

$$71 - 29 = 29$$

$$71 \xrightarrow{-10} 61 \xrightarrow{-10} 51 \xrightarrow{-10} 41 \xrightarrow{-2} 29$$

Tape Diagrams

Tape diagrams are used to show students the ease of subtracting by a multiple of 10. In this example, adding 1 to each number makes a simpler problem to solve.

$$71 - 29 = 42$$

$$72 - 30 = 42$$

Place Value

The understanding of vertical addition and subtraction starts with concrete work with number disks. This manipulative strengthens students' place value understanding and helps them model the standard addition algorithm. Students will move to a more abstract approach in which the disks are replaced with circles and dots. These drawings are slowly taken away, ending with students only using the abstract calculation.

tens	ones
●●	●●●●●●●●
●●●●	●●
●●●●●●●●	●●

$$\begin{array}{r} 29 \\ + 42 \\ \hline 71 \end{array}$$

When adding, students bundle groups of 10 and indicate carrying within the algorithm.

tens	ones
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●●	●●●●●●●●

$$\begin{array}{r} 611 \\ - 29 \\ \hline 42 \end{array}$$

When subtracting, students are encouraged to "be a detective" and see if they need to do any unbundling before they can subtract. In this example, students see that they cannot take away 9 ones from 1 one, so they unbundle and record it in the algorithm on the side.

tens	ones
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$$\begin{array}{r} 611 \\ - 29 \\ \hline 42 \end{array}$$

After students have been a detective and are ready to subtract, they show their work in the place value chart and record the solution in the algorithm. The place value chart is slowly removed, ending with students using only the subtraction algorithm.

