

Operations and Algebraic Thinking

The focus of the work with operations in this module involves the development of the relationship between addition and subtraction. Children have used stories and everyday situations to investigate the connection between addition and subtraction. In this module, the relationship between these two operations will be formalized.

The first lesson in this module reinforces the part-part-total idea and using the known information in a story or problem to decide whether addition or subtraction is used to figure out the answer (the unknown number). This work is extended by writing an addition number sentence to match a real situation and then discussing how the same situation could be used to write subtraction sentences. For example, a picture of apples (3 green and 4 red) could be described as $3 + 4 = 7$. If the green (or red) apples are removed, the children are encouraged to give the sentence they would write ($7 - 3 = 4$ or $7 - 4 = 3$). This activity leads to writing all of the related number sentences or the fact family, for a part-part-total situation.

Because of the work to develop the link between addition and subtraction, this is a natural place to introduce unknown-addend (or missing-addend) subtraction. This type of subtraction is of course related to take-away subtraction because in both, the known information is one part and the total. The unknown information is the other part. However, the story structure is different. For take-away subtraction, the children start with a total and the part is removed. Unknown-addend stories suggest beginning with the part and figuring out what must be added to reach the total. For example, "I have \$8 and want to buy a game that costs \$11. How much more money do I need?" When the numbers are small, it may not be easy to see that subtraction is involved. But, this is a problem where the total and one part are known so we can write $11 - 8 = \underline{\quad}$ even though we might think $8 + \underline{\quad} = 11$ to figure out the answer. And this is the point for including this type of subtraction here. Later in the overall development, we will want students to see subtraction such as $\$35 - \$19 = \underline{\quad}$ and think "I can figure out the answer by starting at 19 and then figuring out what I need to add on to make 35."



For professional learning on this content, select the following videos from the resources tab at top right of screen.

CLSS *Using Language Stages to Develop Subtraction Concepts*

CSFS *Teaching the Think-Addition Subtraction Fact Strategy*

CAP1 *Using Active Problems to Relate Addition and Subtraction and Introduce Functions*

CSP1 *Using Static Problems to Relate Addition and Subtraction and Introduce Equality*

Number and Operations in Base Ten

In the examples above, the children are involved in activities to compose or decompose numbers as they add or subtract across 10, for example, they add $8 + 3$ by decomposing 3 into $2 + 1$ so that $8 + 3 = \underline{\quad}$ becomes $8 + 2 + 1 = \underline{\quad}$. They use similar thinking to help figure out the missing addend in the number sentence $8 + \underline{\quad} = 11$.

Measurement and Data

This module continues the work with time. The idea of time as cycles, like the numbers around a clock, is discussed. The children see that the seven days of a week form a cycle and then discuss the seasons (as a cycle). Finally they discuss the cycle of 12 months in a year and use the circle representation of the months to make a birthday graph.

Children use the analog and then digital clock to read half-past-the-hour times. The analog clock shows why this fraction language makes sense. It helps children see that 30 minutes around the clock is halfway. This is essential before children read digital times such as 4:30 using half-past language.