Addition Pairs Up to 10 + 10 in Investigations:
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In the curriculum Investigations in Number, Data, and Space, students develop knowledge of the addition pairs to 10 + 10 beginning with activities in kindergarten and continuing through grade 3. The goal is for students to become fluent with all the pairs (as well as with many other number combinations). Fluency means that students can use these number pairs quickly and easily as they solve problems.

In Investigations, students encounter addition and subtraction together. They are encouraged to use the relationship between these two operations to solve problems. For instance, in order to figure out what goes with 5 to make 11, a student might use a strategy based on addition, such as "5 and 5 is 10, and 1 more is 11, so it's 6" or a strategy based on subtraction, such as "1 less than 11 is 10, and then take away 5 more to get to 5, so it's 6." As students develop and share strategies for activities such as those listed below, they learn ways to solve addition and subtraction pairs, and they practice with these pairs.

Kindergarten

Students begin developing meaning for addition pairs through activities that involve objects, pictures, stories, and numbers. They combine amounts up to about 6 with totals up to about 12, with an emphasis on combinations of 5 and 6.

Most students model the problem with objects or pictures and count them to find a total. Some students count the quantities mentally or count on from one quantity. Some students learn a few pairs involving small numbers, such as 1 + 2 or 2 + 2.

Selected activities: Racing Bears (Collecting, Counting, and Measuring and How Many in All?); Double Compare, Combining and Separating Stories, Books of 6 Tiles, Towers of 6, Total of 6, Five in All (How Many in All?)

Grade 1

Students continue to develop meaning for addition pairs through work with a variety of models and materials. They find combinations of numbers up to about 20, with many opportunities to work on combinations of 10.

As in Kindergarten, most students use counting strategies. Over the course of the year, they begin to develop more efficient counting strategies: they more often count mentally, rather than counting out objects or pictures, and they more often count on from one quantity, rather than counting from 1 each time. Most students also begin to develop a repertoire of pairs they know, such as the pairs involving +1 and +2, and the smaller doubles, such as 2 + 2 and 3 + 3.

Some first graders begin using pairs they know to solve unfamiliar ones. For instance, they might break up the numbers in the pair to make a combination of 10 ("I know 8 and 4 is 12 because I took 2 from the 4 and put it with the 8 to make 10. Then, 2 and 10 is 12."), or they might reason about relationships among pairs ("4 and 3 is 7 because 3 and 3 is 6, and 4 is 1 more"). First graders who use such strategies often do so only for pairs involving small or very familiar numbers: these are the quantities they understand well. They continue to use counting strategies for pairs involving larger or less familiar numbers.

Selected activities: Double Compare, How Many of Each? problems (Mathematical Thinking at Grade 1 and Building Number Sense); Ten Turns, Towers of 10 (Building Number Sense); On and Off, Counters in a Cup, Dot Addition, Five-in-a-Row, Combining and Separating Story Problems (Building Number Sense and Number Games and Story Problems); Total of 10, Crayon Puzzles, Tens Go Fish (Number Games and Story Problems)

Grade 2

Students engage in many activities that provide practice with strategies for learning pairs and for using known pairs to solve new ones. For instance, they work on activities that involve finding doubles and finding combinations of 10.

Students come to learn many of the pairs through repeated use and familiarity; others they solve using quick and comfortable reasoning strategies such as: using familiar doubles to solve less familiar ones ("I know that 6 + 6 is 12, so 7 + 7 is two more, or 14"); using familiar doubles to solve "near doubles" such as 3 + 4 and 4 + 5 ("4 and 5 is 9 because 4 and 4 is 8, and 1 more is 9," or, "4 and 5 is 9 because 5 and 5 is 10 and 1 less is 9"); using knowledge about patterns in tens and ones to solve the 10 + combinations, such as 10 + 3 and 10 + 8; and using knowledge about combinations of 10 to solve difficult combinations such as 7 + 5 and 6 + 8 ("6 and 8 is 14 because you can take 4 from the 8 and put it with the 6 to make 10, and there's 4 more").

As students' understanding of number grows, they become more comfortable using such strategies to solve any pairs they do not know--not just pairs involving small numbers. However, some students may still count on mentally to solve difficult pairs.

Selected activities: The Book of 10, Ways to Make 10 with Two Addends (Introduction to Mathematical Thinking at Grade 2); Tens Go Fish, Turn Over 10 (Introduction to Mathematical Thinking at Grade 2 and Coins, Coupons, and Combinations); Two of Everything, Combinations Related to Doubles, Number Strings, Beat the Calculator, Close to 20, and Strategies for Adding Two Numbers (Coins, Coupons, and Combinations); Today's Number (used throughout grade 2)

Grade 3

Students learn all the addition pairs up to 10 + 10. They continue to engage in activities that provide work on effective strategies for learning pairs such as finding doubles, adding 10 to a number, and finding sums that make 10.

At the start of the year, students identify and work on specific pairs they are having difficulty with. They find and record strategies for learning these pairs, and they share their strategies with their classmates. They continue to work on these pairs until they know them fluently.

Selected activities: Doubling with Pattern Blocks, What combinations make 10?, Which Are Hard? Which Are Easy?, Learning Difficult Combinations (Mathematical Thinking at Grade 3)